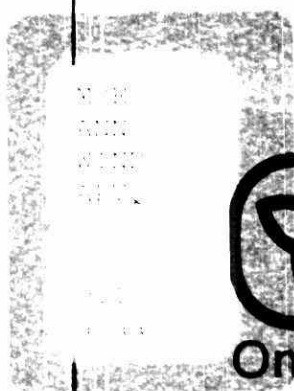


ANNUAL WIND ROSES FOR ONTARIO (UNBIASED)

Report WR-78-1A

1978



Ministry
of the
Environment

The Honourable
Harry C. Parrott, D.D.S.,
Minister

Graham W. Scott,
Deputy Minister

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Annual Wind Roses
for Ontario
(Unbiased)

Report WR-78-1A

Air Quality and Meteorology Section
Air Resources Branch
Ontario Ministry of the Environment
December 1978

MOE
ANN
WIND
APVQ

Report WR-78-1A

Project Manager

Joel Kurtz

Data Processing

Fred Nobles

Programming

Patrick Chau

16-Point Observer Bias

We have found that many of the 16-point wind roses include an observer bias which is manifested in the greater frequency of winds from the eight primary directions (N, NE, E, SE, S, SW, W, NW) than of winds from the other eight points (See Armstrong, for example). A method, proposed by Munn¹, for removing this effect was applied as follows.

1. The 16-point wind is transformed by apportioning, for example, NNE cases to N and NE on the basis of the comparative frequencies of N and NE directions.

For the case of Armstrong, this would result in the following transformation:

Reported 16-point Wind Rose

N	8
NNE	2
NE	4
ENE	1
E	5
ESE	2
SE	12
SSE	3
S	7
SSW	2
SW	5
WSW	3
W	11
WNW	6
NW	13
NNW	5
Calm	9

Transformed 8-point Wind Rose

N'	8 + 1.3 + 1.9
NE'	4 + 0.7 + 0.4
E'	5 + 0.6 + 0.6
SE'	12 + 1.4 + 1.9
S'	7 + 1.2 + 1.1
SW'	5 + 0.8 + 0.9
W'	11 + 2.8 + 2.1
NW'	13 + 3.2 + 3.1
Calm	9

2. Of the adjusted frequencies of N, for example, half are assumed to belong to the central 22.5° of the 45° sector. The other half are then shared between NNW and NNE but weighted according to the comparative frequencies of NW' , N' and NE' . We get:

$$\begin{aligned}
 N &= \frac{1}{2} N' & S &= \frac{1}{2} S' \\
 NNE &= NE' \left(\frac{N'}{N' + NE'} \right) X_{NE'} & SSW &= SW' \left(\frac{S'}{S' + SW'} \right) X_{SW'} \\
 NE &= \frac{1}{2} NE' & SW &= \frac{1}{2} SW' \\
 ENE &= NE' \left(\frac{E'}{E' + NE'} \right) X_{NE'} & WSW &= SW' \left(\frac{W'}{W' + SW'} \right) X_{SW'} \\
 E &= \frac{1}{2} E' & W &= \frac{1}{2} W' \\
 ESE &= SE' \left(\frac{E'}{E' + SE'} \right) X_{SE'} & WNW &= NW' \left(\frac{W'}{W' + NW'} \right) X_{NW'} \\
 SE &= \frac{1}{2} SE' & NW &= \frac{1}{2} NW' \\
 SSE &= SE' \left(\frac{S'}{S' + SE'} \right) X_{SE'} & NNW &= NW' \left(\frac{N'}{N' + NW'} \right) X_{NW'}
 \end{aligned}$$

$$Calm = 9$$

where

$$\begin{aligned}
 1 &= \frac{X_{NE'} N'}{N' + NE'} + \frac{X_{NE'} E'}{E' + NE'} \\
 1 &= \frac{X_{SE'} E'}{E' + SE'} + \frac{X_{SE'} S'}{S' + SE'} \\
 1 &= \frac{X_{SW'} S'}{S' + SW'} + \frac{X_{SW'} W'}{W' + SW'} \\
 1 &= \frac{X_{NW'} W'}{W' + NW'} + \frac{X_{NW'} N'}{N' + NW'}
 \end{aligned}$$

So that the "unbiased" wind rose for Armstrong would be:

N	=	6
NNE	=	3
NE	=	3
ENE	=	2
E	=	3
ESE	=	4
SE	=	8
SSE	=	8
S	=	5
SSW	=	4
SW	=	3
WSW	=	4
W	=	8
WNW	=	12
NW	=	10
NNW	=	8
Calm	=	9

This algorithm was applied to all 16-point wind roses which had the appearance of possessing 16-Point Observer Bias. We leave it to the user, however, to choose between the original wind rose and the "unbiased" version in any particular application.

8-Point Observer Bias

The wind rose for Camp Borden provides an example of observer bias in an 8-point wind. Here, the exaggerated frequencies normally belong to the non-cardinal directions (NE, SE, SW, NW). Bias is removed in these cases by a technique analogous to that for 16-Point Observer Bias except that transformation is initially to a 4-point wind, and then back to an "unbiased" 8-point wind.

The author feels that the "unbiased" version of the Camp Borden wind rose, for example, is probably a better approximation to reality than is the original.

Wind roses are included in this volume for cases of obvious observer bias only. The page numbers correspond to those of Volume WR-78-1.

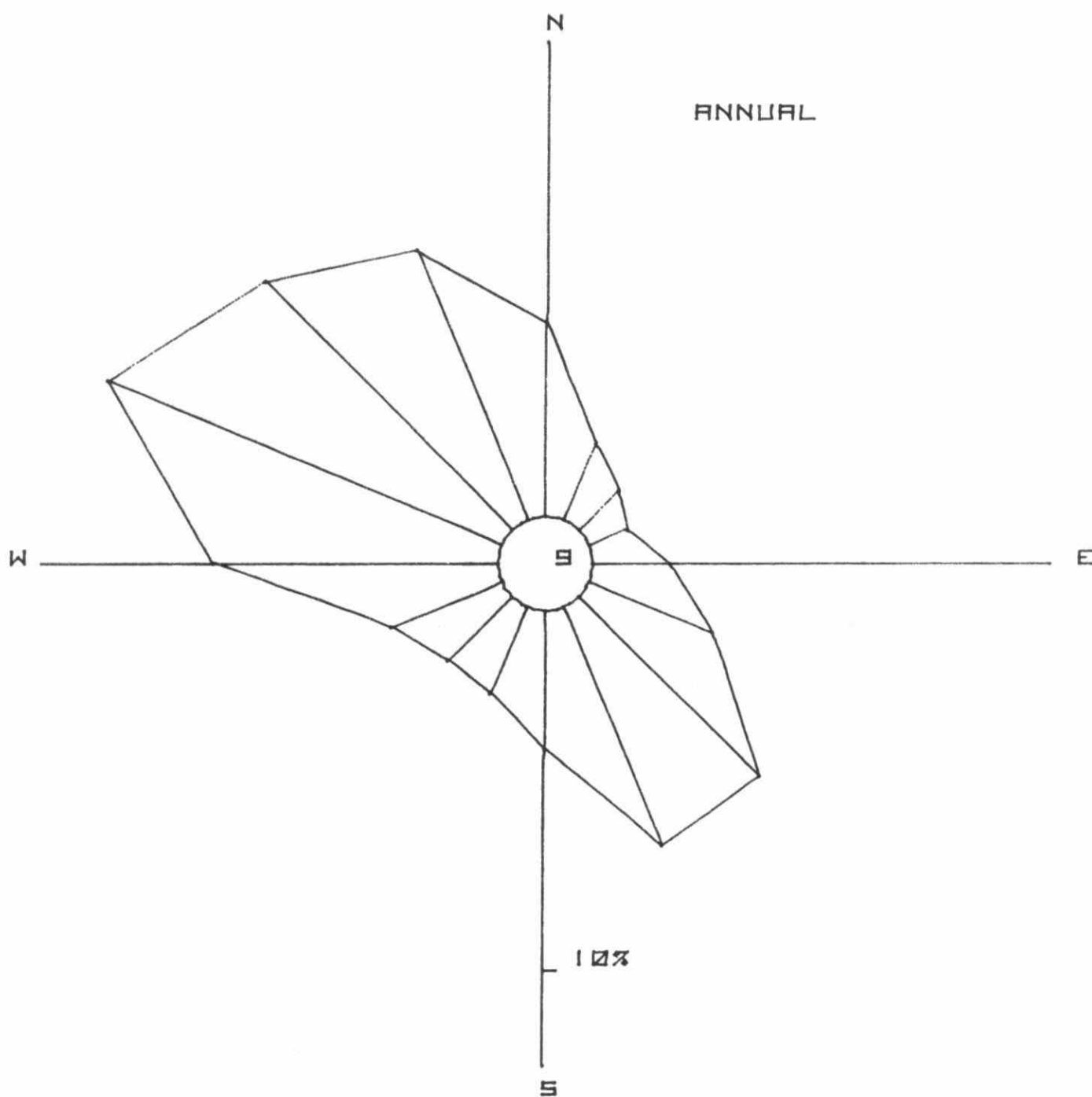
Reference

Munn, R.E., (1970), Biometeorological Methods, Academic Press, New York and London, pp. 103-104.

ARMSTRONG (A) (AES) 1955-1968

02

(BIASES REMOVED)



STATION INFORMATION

LOCATED 11.6KM E OF TOWN AT AIRPORT
 AREA WOODED WITH MANY LAKES AND
 HILLS 1.6-3.2 KM W THRU SSE
 HEIGHT 25.2M

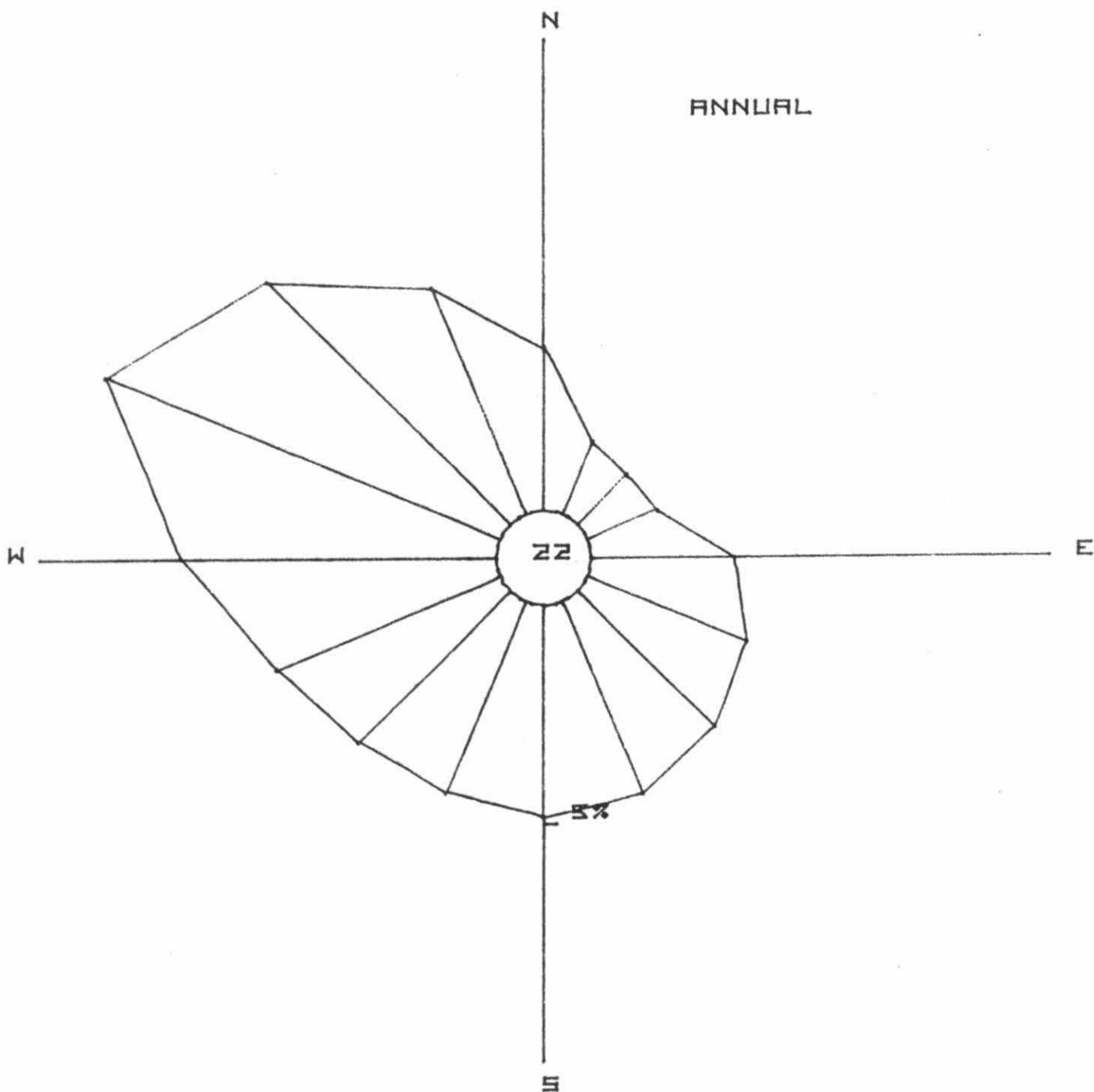
PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
0	3	3	2	3	4	0	0	5	4	3	4	0	12	10	0	0

ATIKOKAN (AES) 1966-1976

08

(BIASES REMOVED)



STATION INFORMATION

LOCATED E SIDE TOWN NE INTERSECTION HWYS
622 AND 118/HILLY ROCKY MINING TERRAIN
WITH HEAVY BUSH AND MANY LAKES
HEIGHT 13.2 M

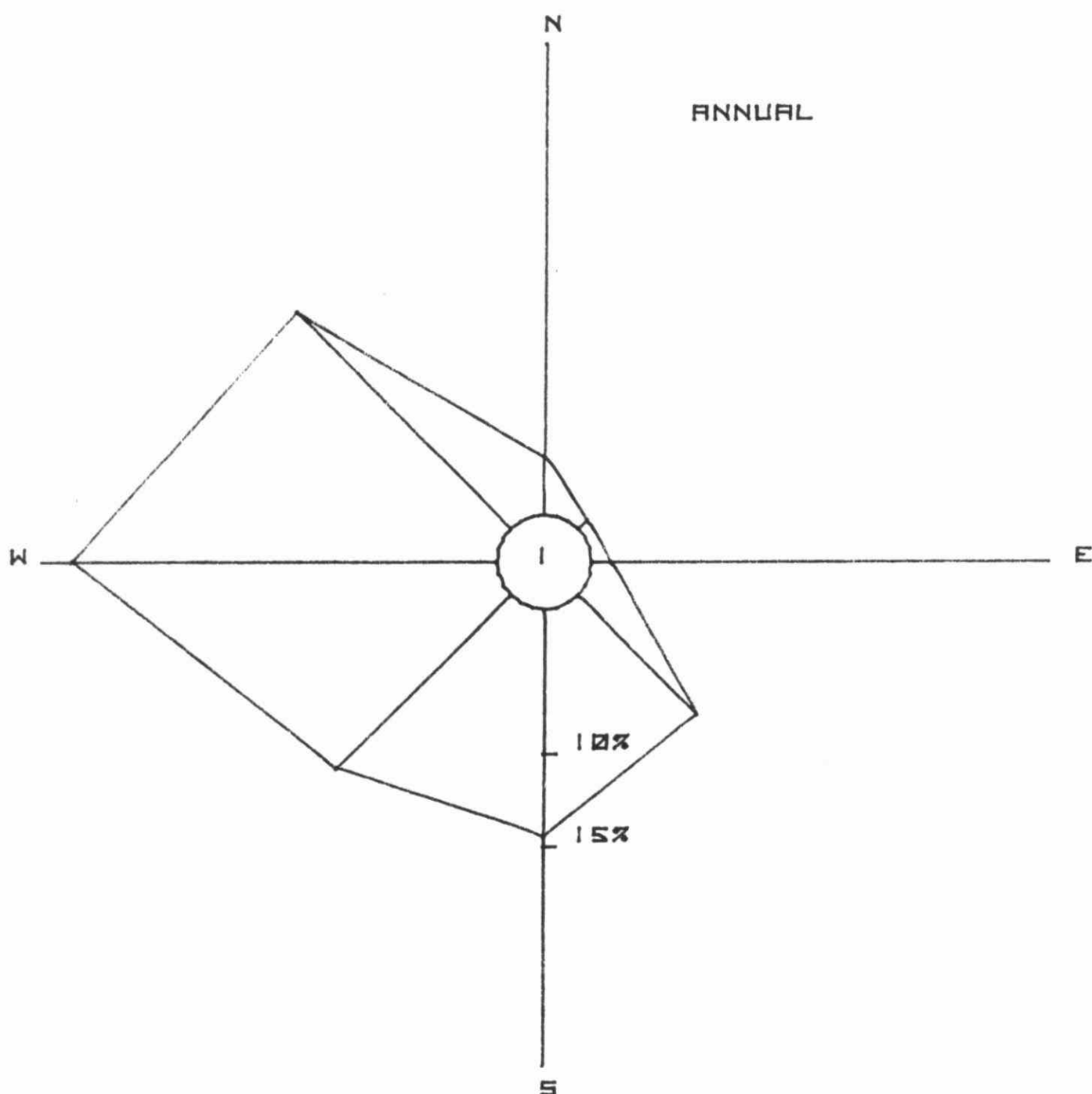
PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
4	2	2	2	4	4	5	5	5	5	5	6	7	8	7	6	22

CAMP BORDEN (AES) 1960-1966

94

(BIASES REMOVED)



STATION INFORMATION

LOCATED

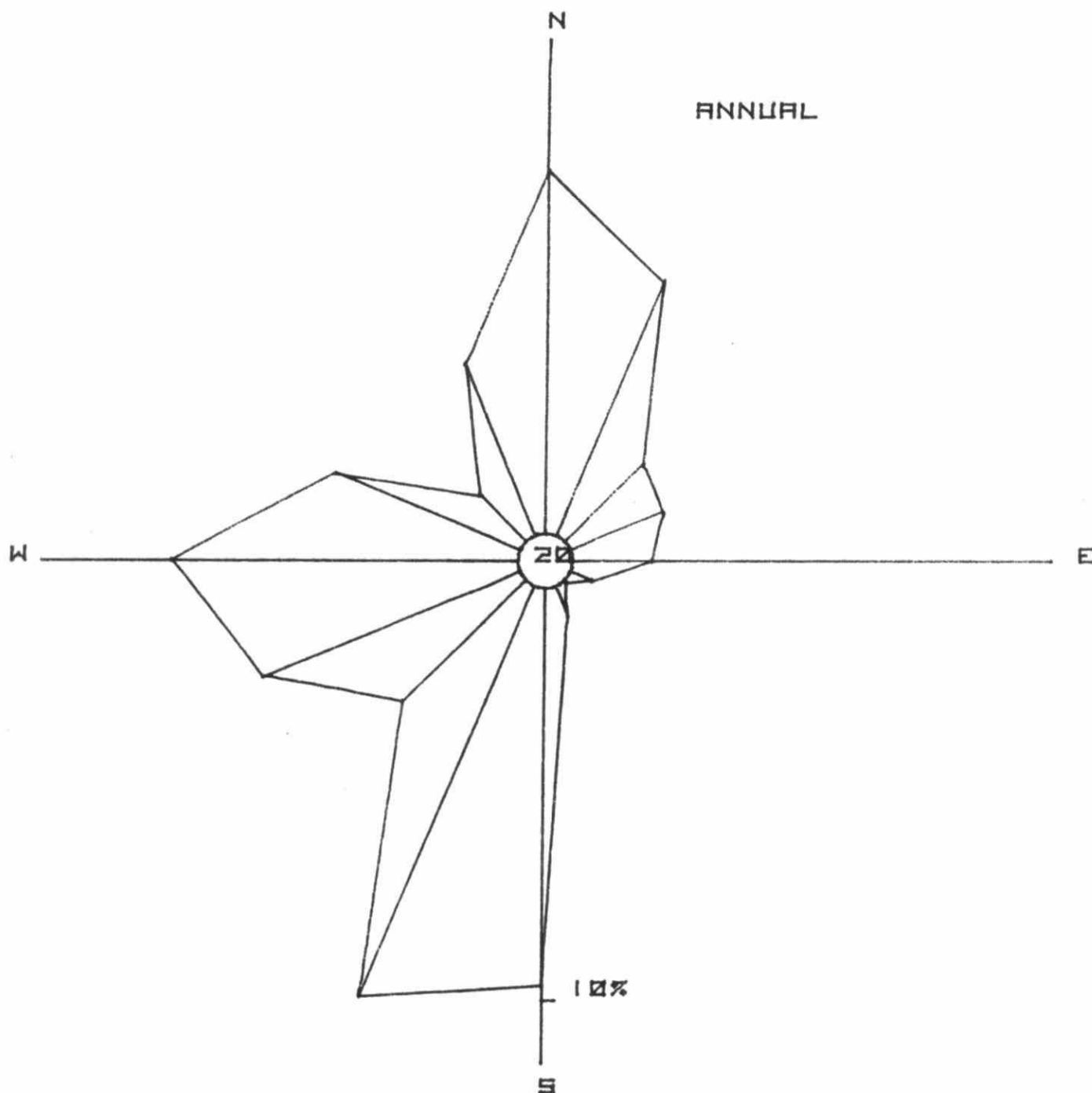
S SECTION MILITARY CAMP, AREA IS FLAT AND
WOODED IN ALL DIRECTIONS
HEIGHT 18.4M

PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
5	3	4	12	15	18	25	18	1

CHAPLEAU (AES) 1965-1972
(BIASES REMOVED)

09



STATION INFORMATION

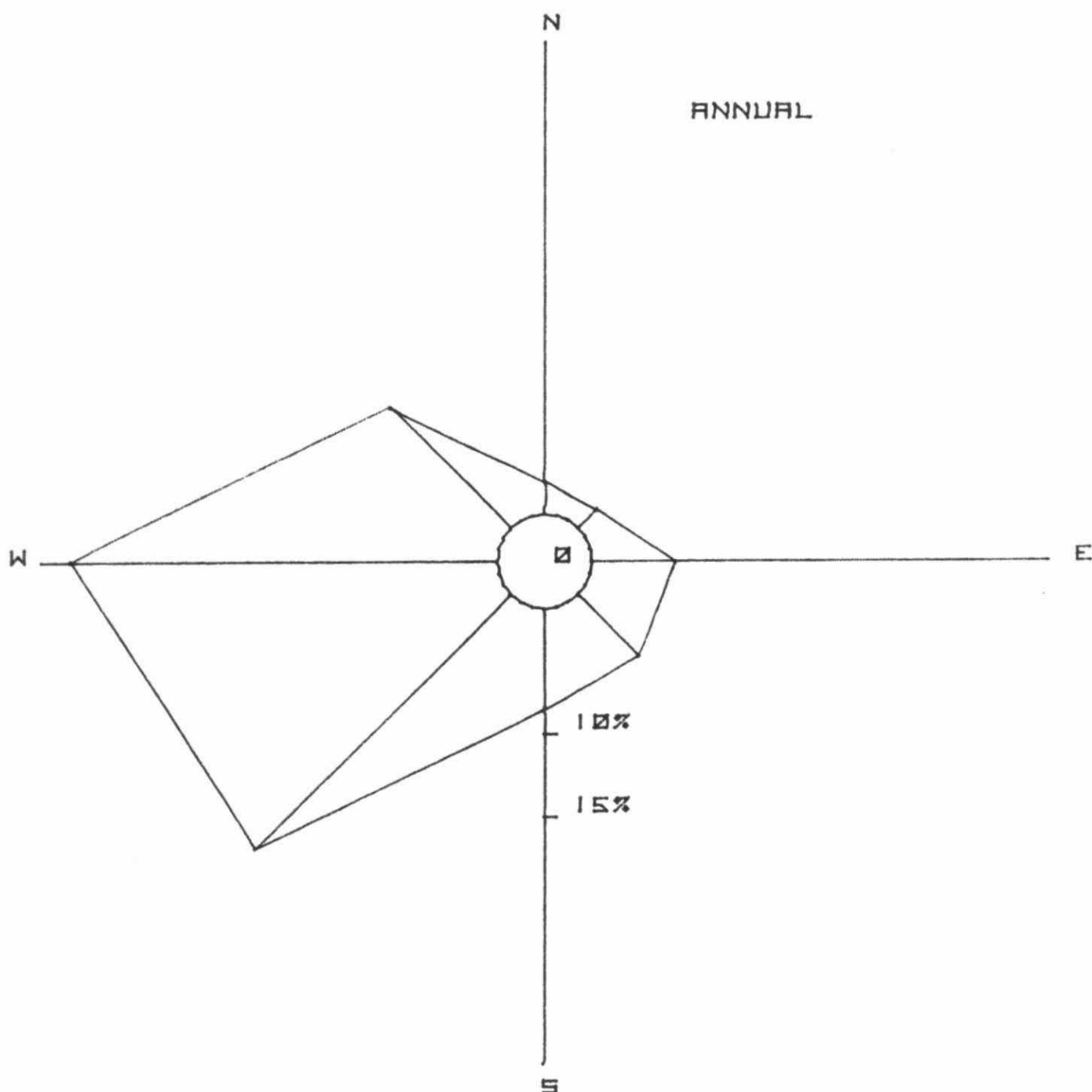
LOCATED E BANK OF CHAPLEAU RIVER, WOODDED
AND HILLY WITH MANY LAKES AND RIVERS,
SURROUNDED BY NARIOUS BLDGS.
HEIGHT 13.2M

PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
8	7	3	3	2	1	1	1	10	11	5	7	8	5	2	5	20

CORNWALL (ARB-56065) 1976
(BIASES REMOVED)

12



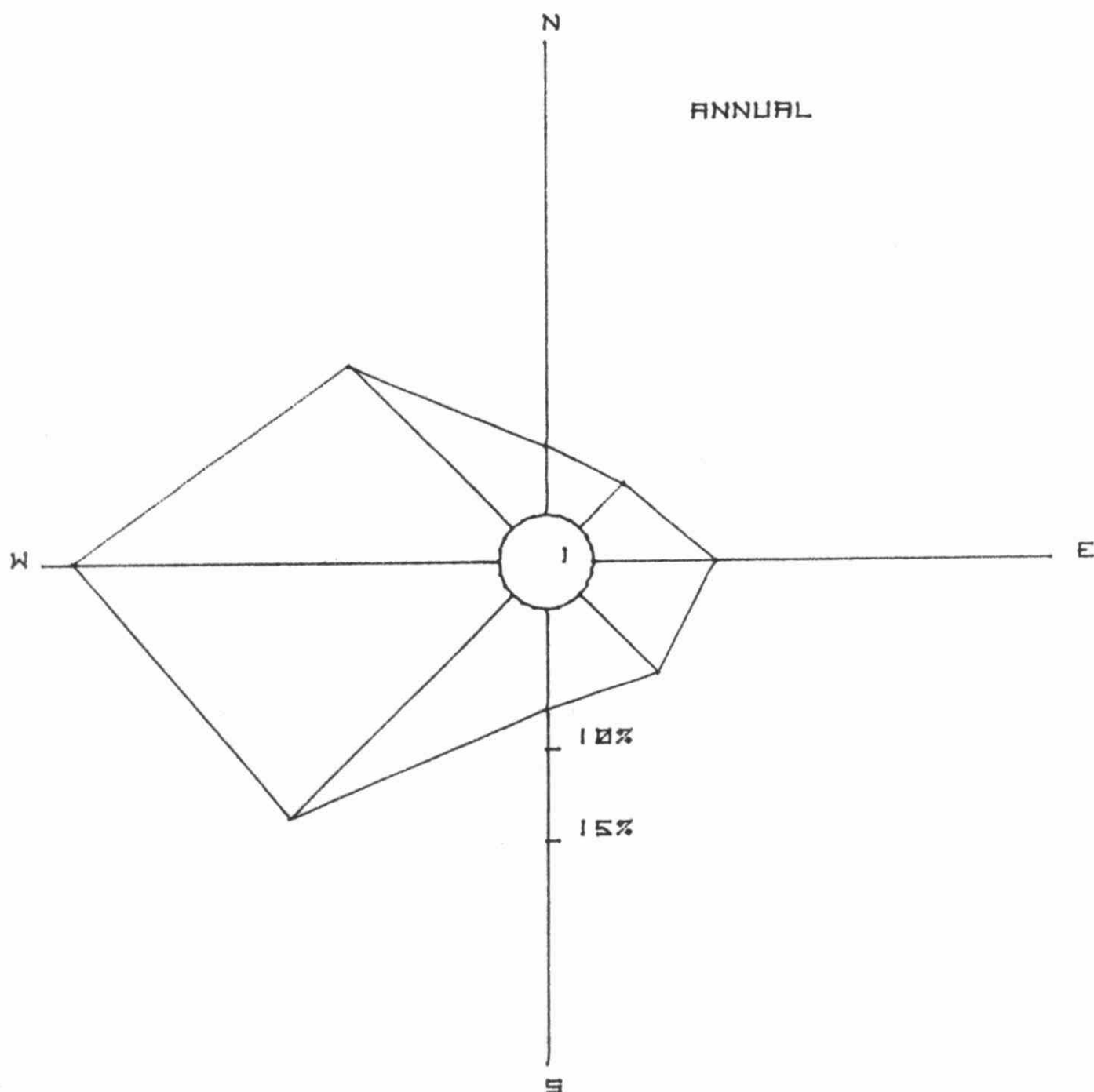
STATION INFORMATION
LOCATED
AT 861 WEST SECOND ST
IN CORNWALL.
HEIGHT UNDER 23M

PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
5	4	8	8	8	24	28	13	0

CORNWALL (ONT HYDRD) 1959-1971

(BIASES REMOVED)



STATION INFORMATION

LOCATED AT TRANSFORMER SITE NW
OF CORNWALL, AREA FLAT, WITH
TOWERS IN ALL DIRECTIONS
HEIGHT 22.5M

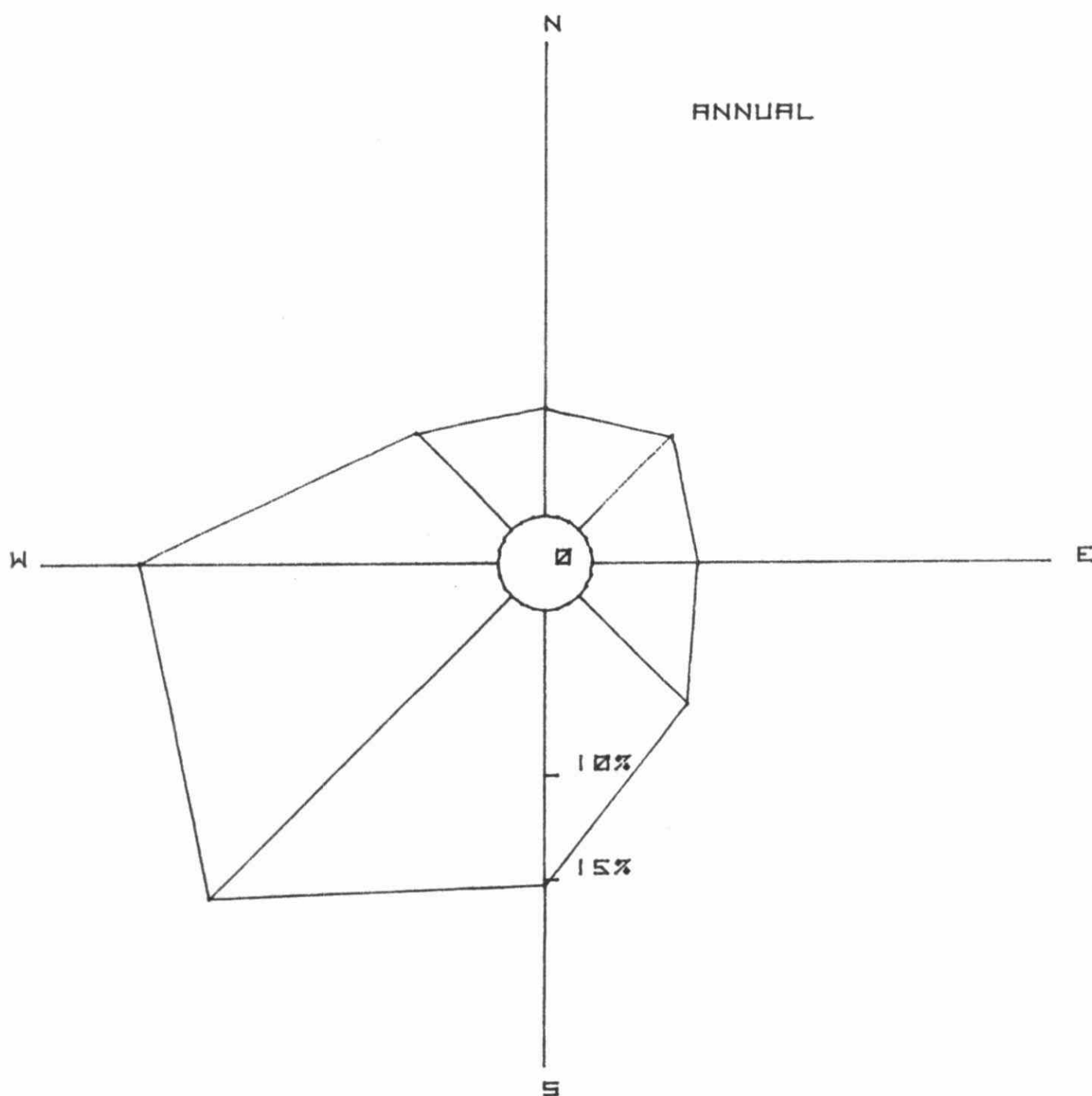
PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
5	5	5	5	5	20	26	15	7

COVE ISLAND (AES) 1965-1972

(BIASES REMOVED)

17



STATION INFORMATION

LOCATED NR LIGHTHOUSE, NE TIP OF ISLAND,
POOR EXPOSURE FROM S TO SW CAUSED BY HIGH
WOODED AREA, OTHERWISE GOOD EXPOSURE
HEIGHT 12.3M

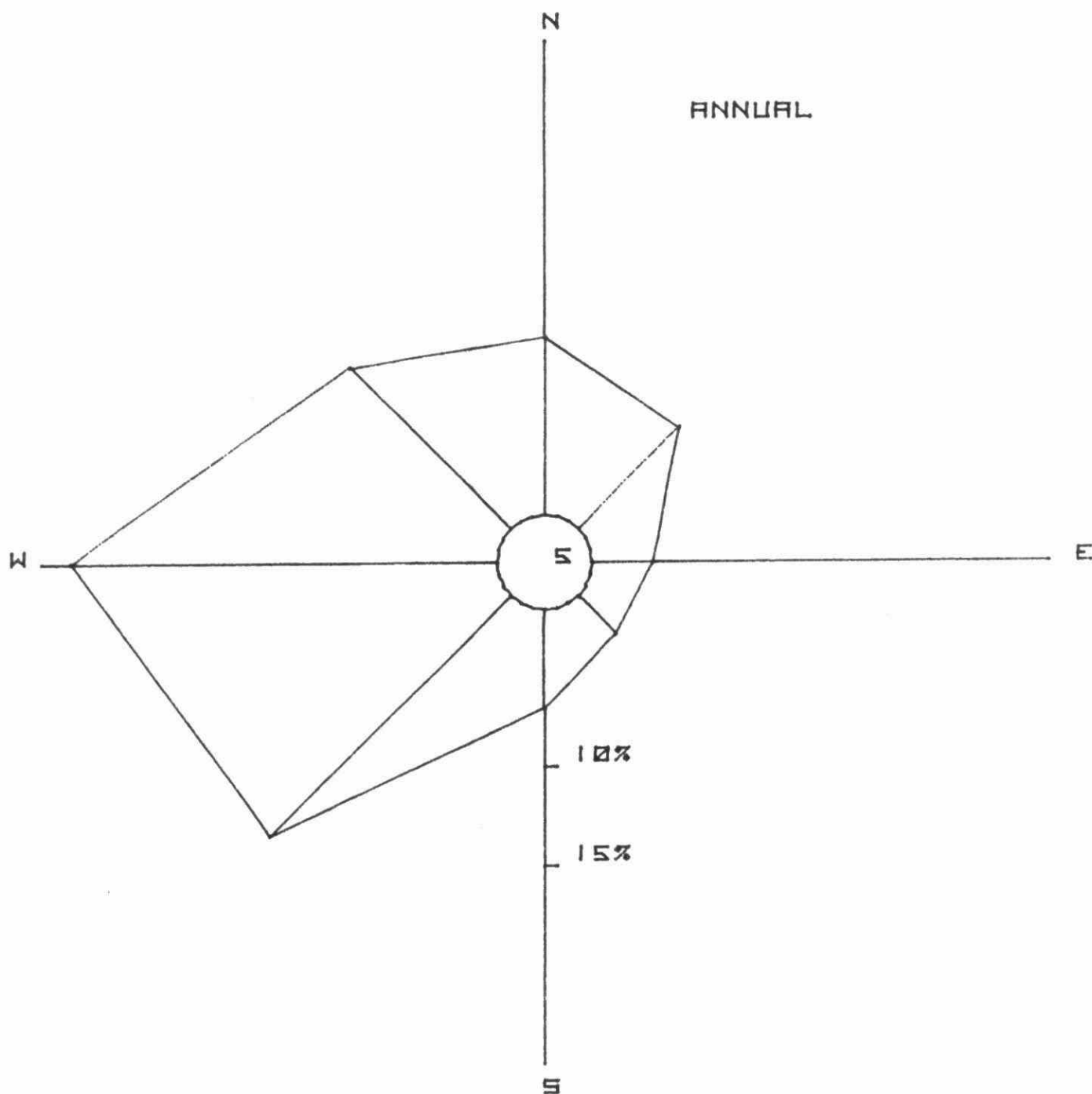
PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
7	8	7	10	18	23	20	8	0

DELHI (AES) 1959-1972

18

(BIASES REMOVED)



STATION INFORMATION

LOCATED AT EXPERIMENTAL FARM, AREA FLAT,
ROLLING LAND IN DISTANCE WITH TREES 4-5M
TALL 84M AWAY, NEAREST BLDG 64M
HEIGHT 9.9M

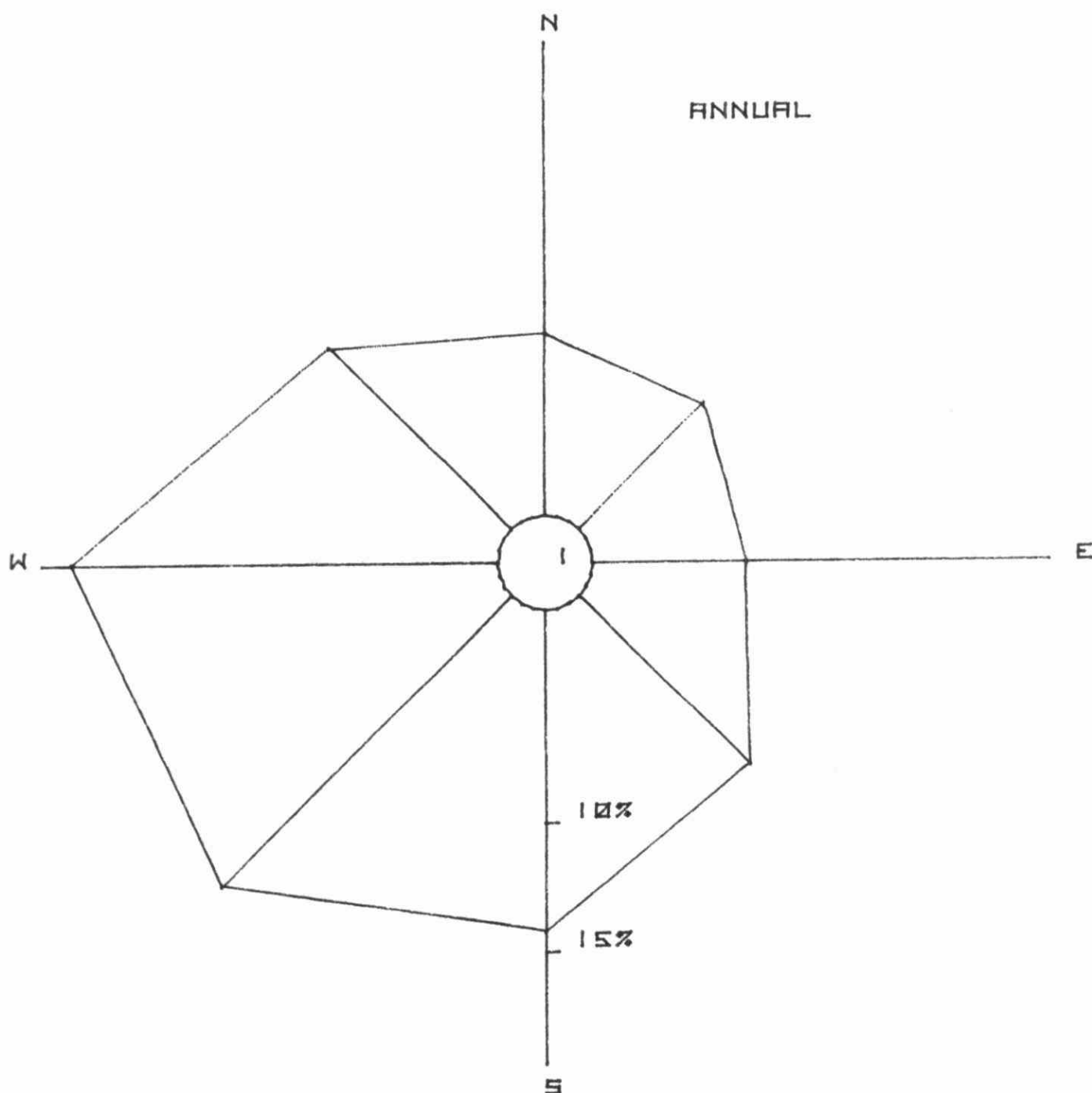
PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
11	9	5	5	7	18	24	14	5

DOUGLAS POINT (AES) 1965-1971

19

(BIASES REMOVED)



STATION INFORMATION

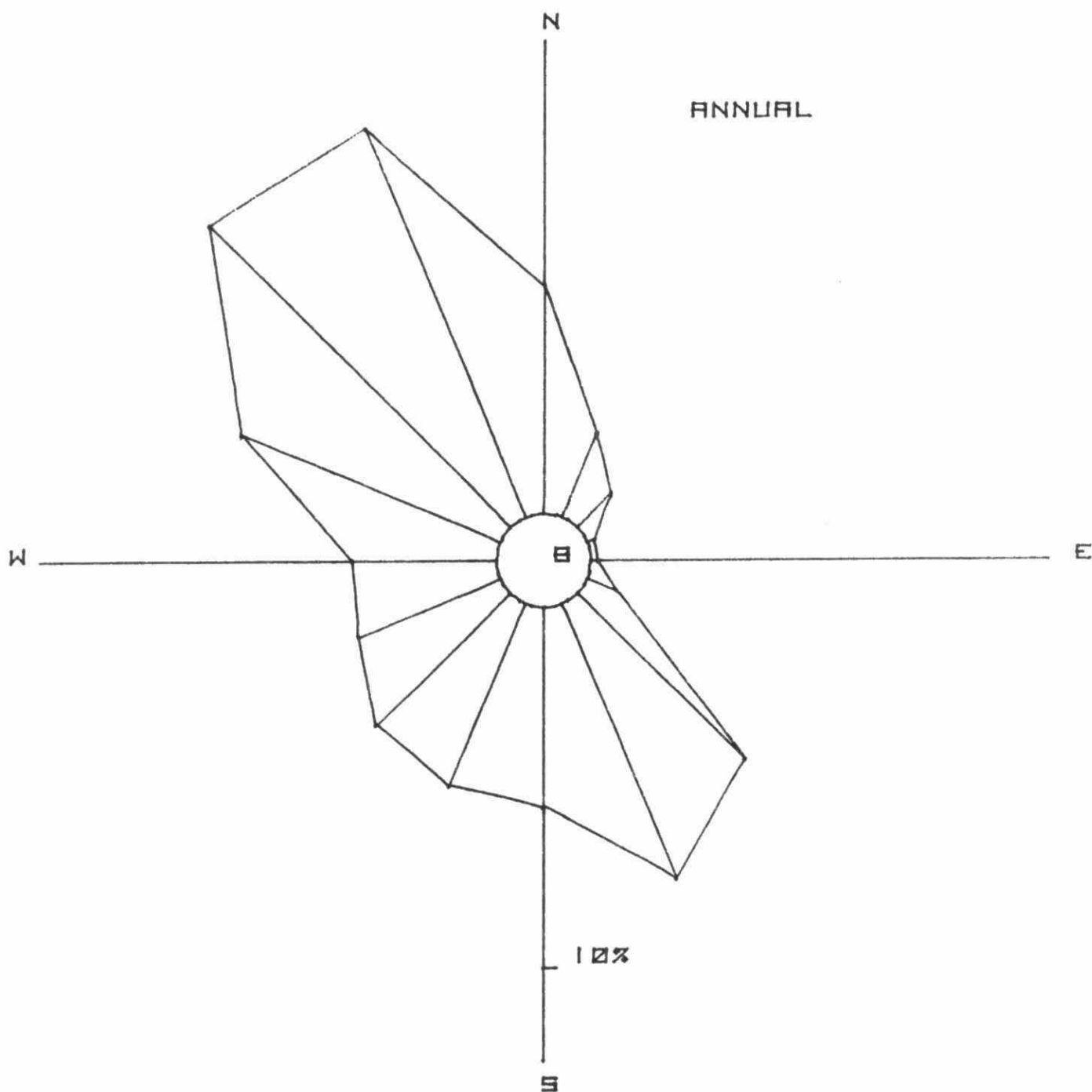
LOCATED 12M E LAKE SHORE IN FLAT HEAVILY
 WOODED AREA. S WINDS AFFECTED BY WOODS AND
 NE WINDS BY POWER PLANT
 HEIGHT 13.2M

PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
8	8	8	11	14	18	18	12	1

EARLTON (AES) 1955-1972

(BIASES REMOVED)



STATION INFORMATION

LOCATED AT AIRPORT 3.1KM
SW OF RAILWAY STN AND VILLAGE,
AREA FLAT AND CLEAR OF BUSH
HEIGHT 19.7M

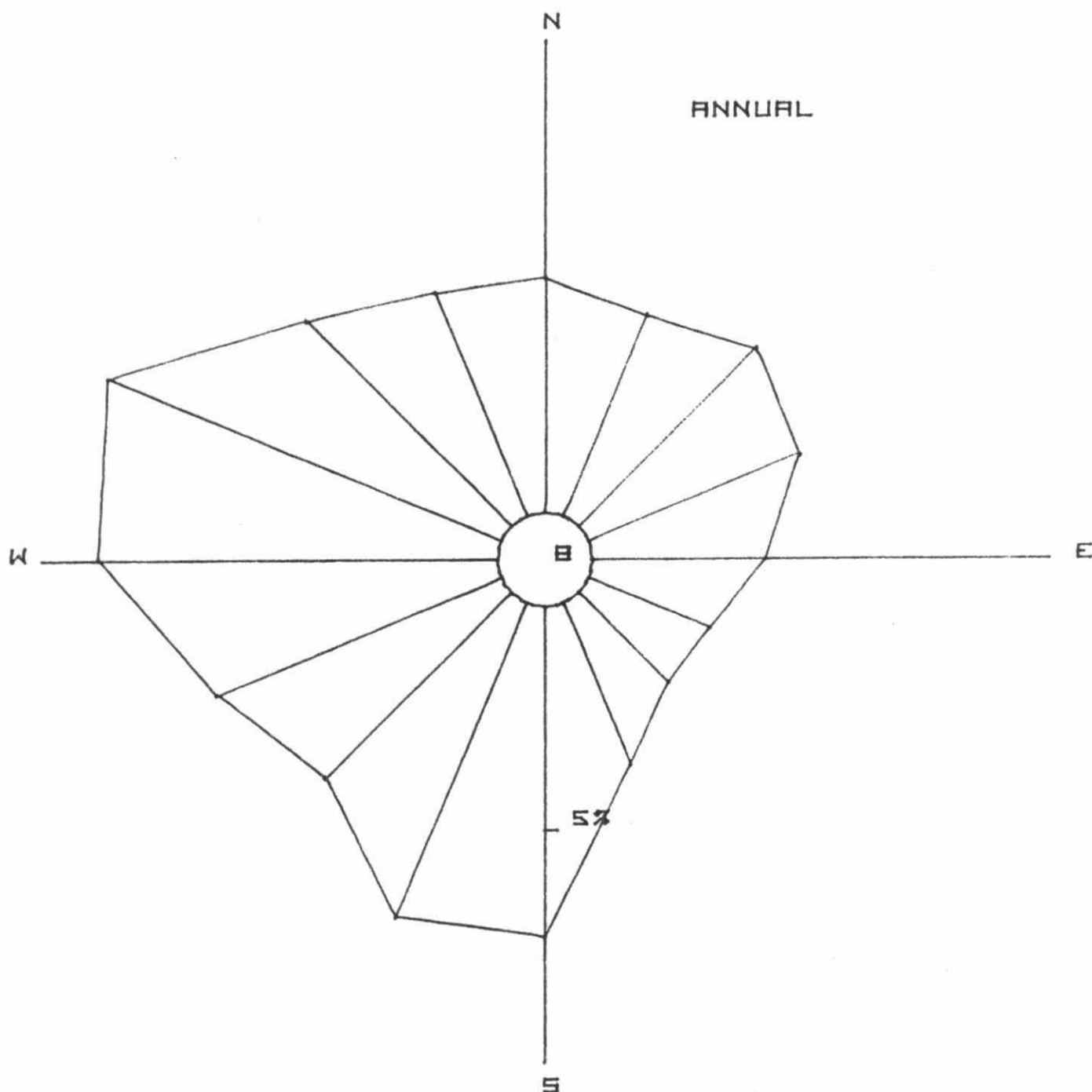
PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
7	3	2	1	1	2	7	8	8	6	6	5	5	8	12	12	8

GORE BAY (AES) 1955-1972

26

(BIASES REMOVED)



STATION INFORMATION

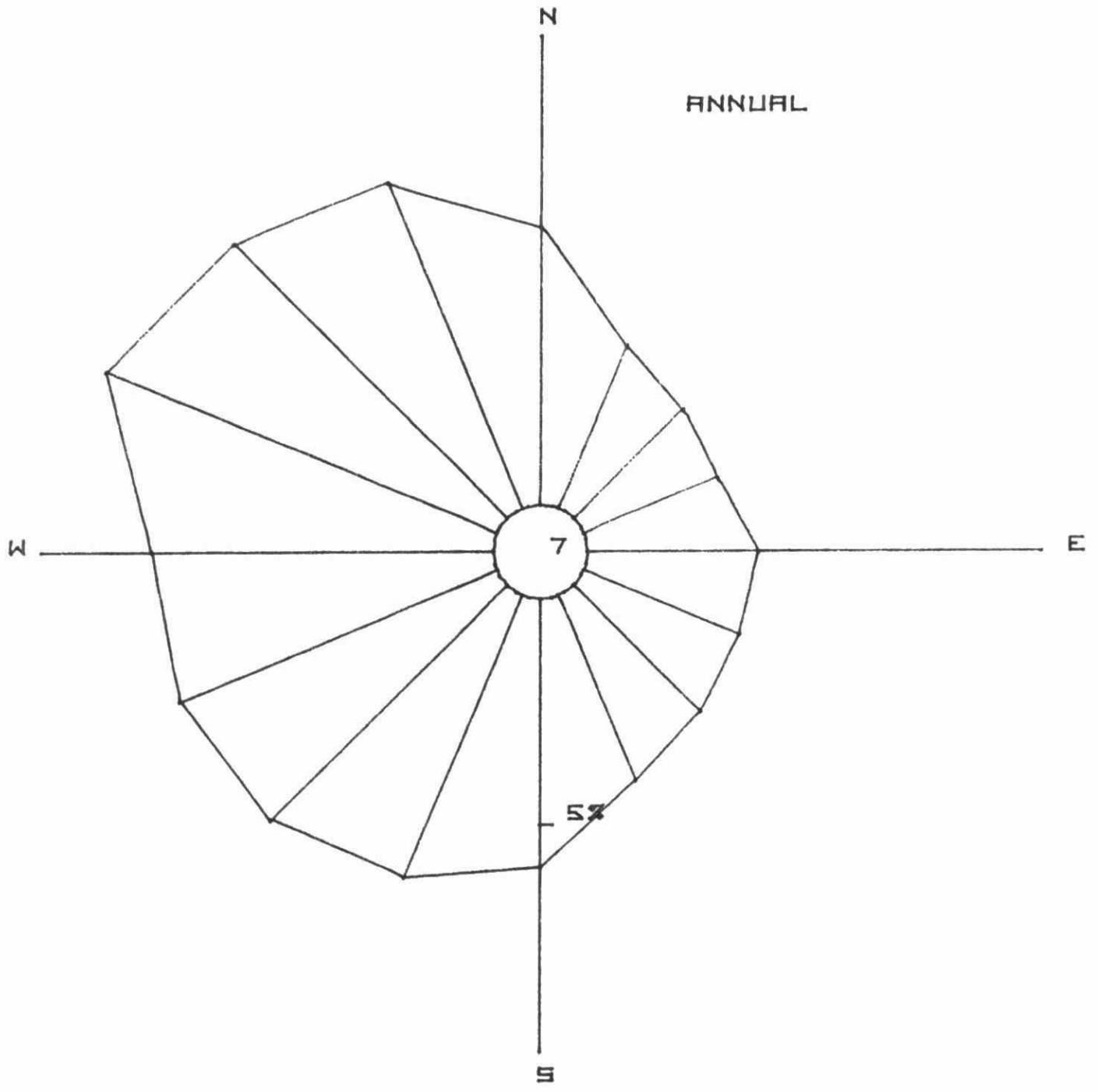
LOCATED 1.2KM TO N AND E IN FLAT AREA,
ANEMOMETER TOWER IS 3.8M S OF OPS BLDG,
BASE OF TOWER 6.2M ABOVE GROUND.
HEIGHT 9.8M

PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
5	5	8	5	4	3	3	4	7	7	8	7	8	8	8	5	8

GRAHAM (A) (AES) 1955-1967
(BIASES REMOVED)

ANNUAL



STATION INFORMATION

LOCATED 3.2KM NW OF VILLAGE IN WOODED
AREA WITH LOW ROLLING HILLS AND MANY
SMALL LAKES.
HEIGHT. 16M

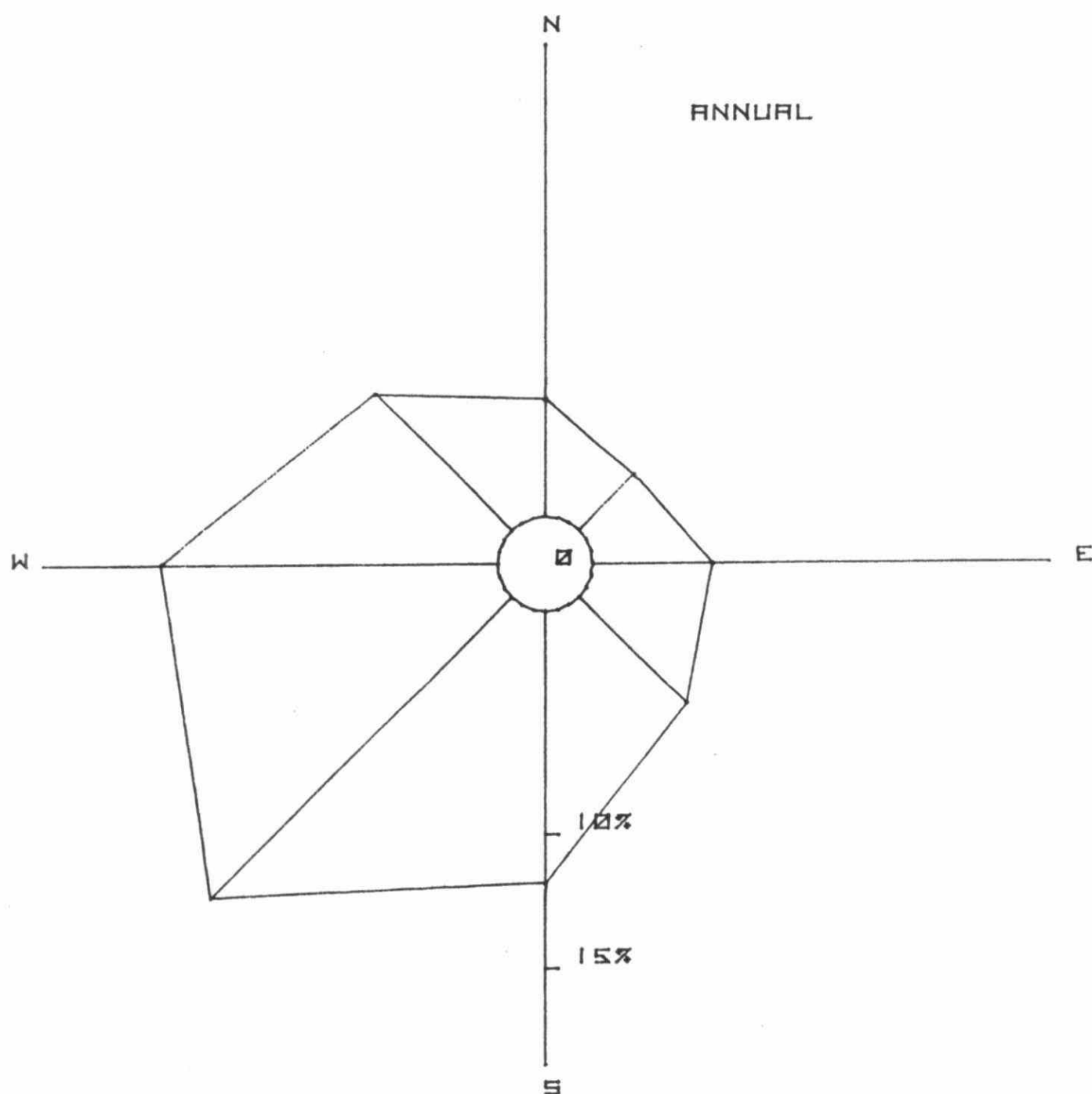
PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
8	4	4	4	4	4	4	5	8	7	7	7	7	8	8	7	7

GREAT DUCK ISLAND (AES) 1966-1972

28

(BIASES REMOVED)



STATION INFORMATION

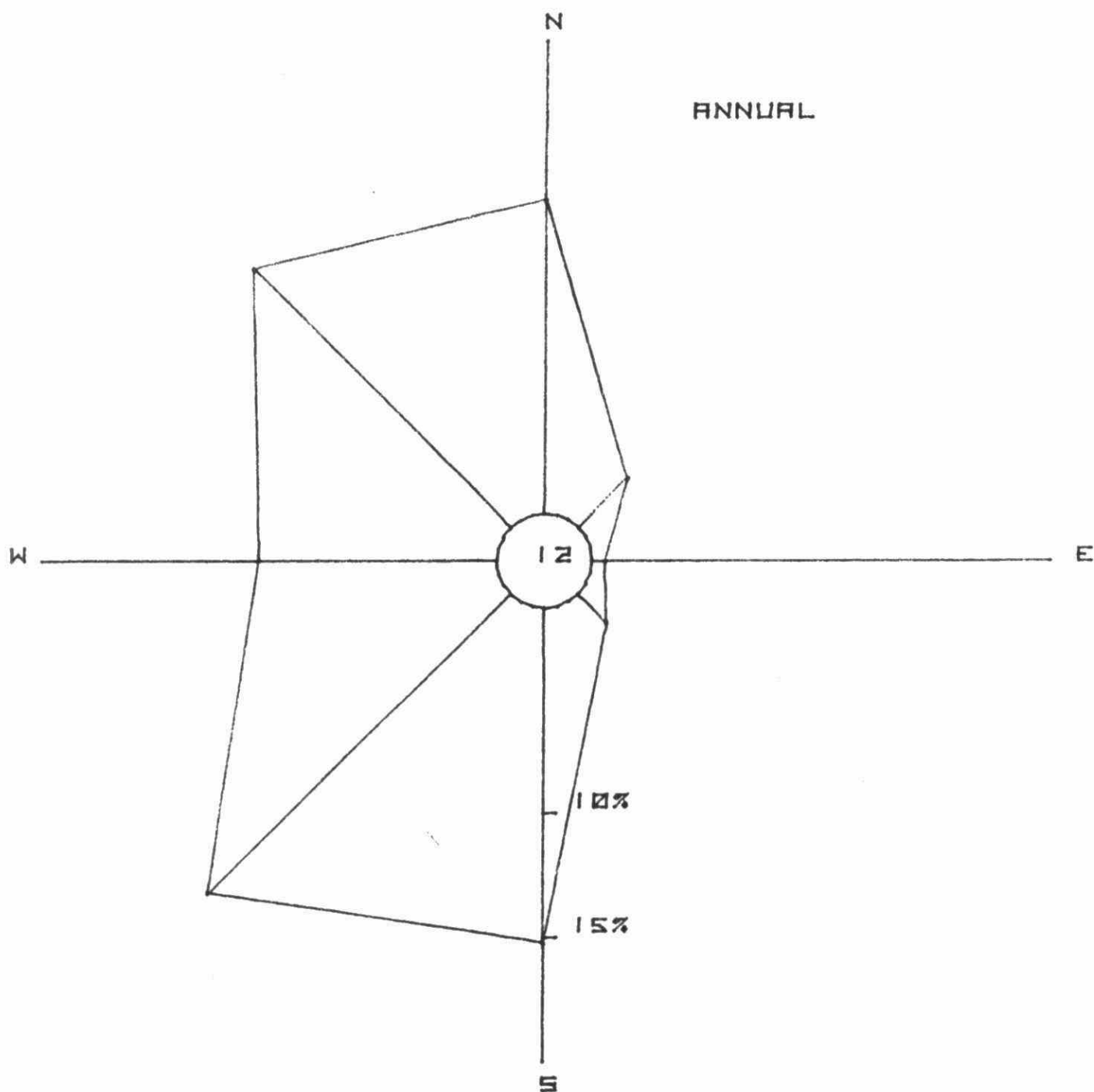
LOCATED ON LIGHTHOUSE NE ON ISLAND. A HILL IS IN CENTRE OF ISLAND 3.2KM N FROM LIGHTHOUSE. AREA IS WOODED WITH TALL TREES. HEIGHT 28.3M

PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
6	5	6	7	12	18	14	8	0

HAILEYBURY (AES) 1937-1960 (BIASES REMOVED)

30



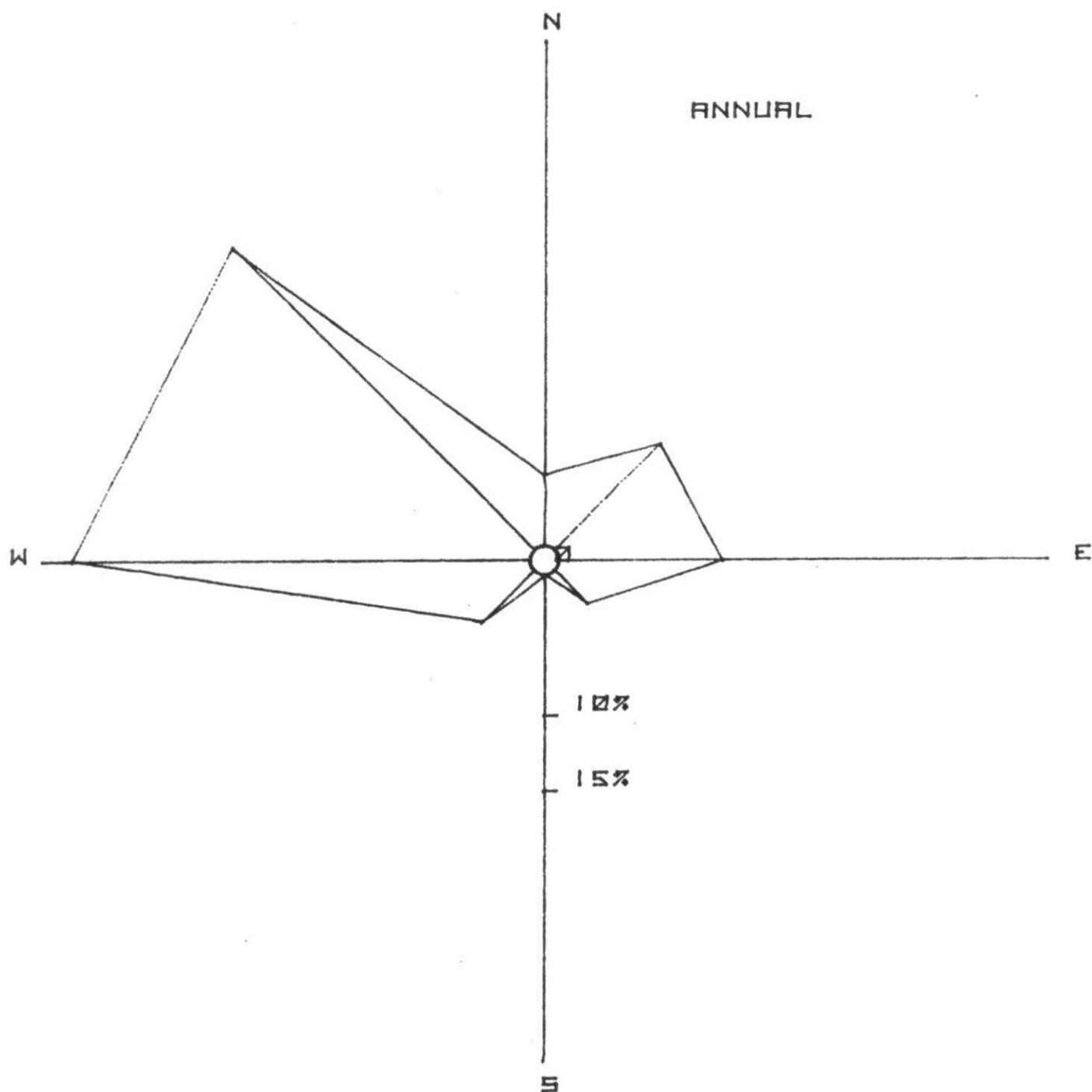
STATION INFORMATION

LOCATED WAS IN TOWN ON W SIDE OF LAKE
TEMISKAMING WITH GRADUAL UPSLOPE W AWAY
FROM LAKE.
HEIGHT 12.3M

PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
15	5	2	4	15	15	11	17	12

(BIASES REMOVED)



STATION INFORMATION

LOCATED ON PIPE MAST ATOP POLICE BLDG.
 AT DOCK ON S SIDE AT W END OF HARBOUR.
 LAKE ONTARIO 5KM E/ESCARPMENT 3.2KM S.
 HEIGHT 15.7M

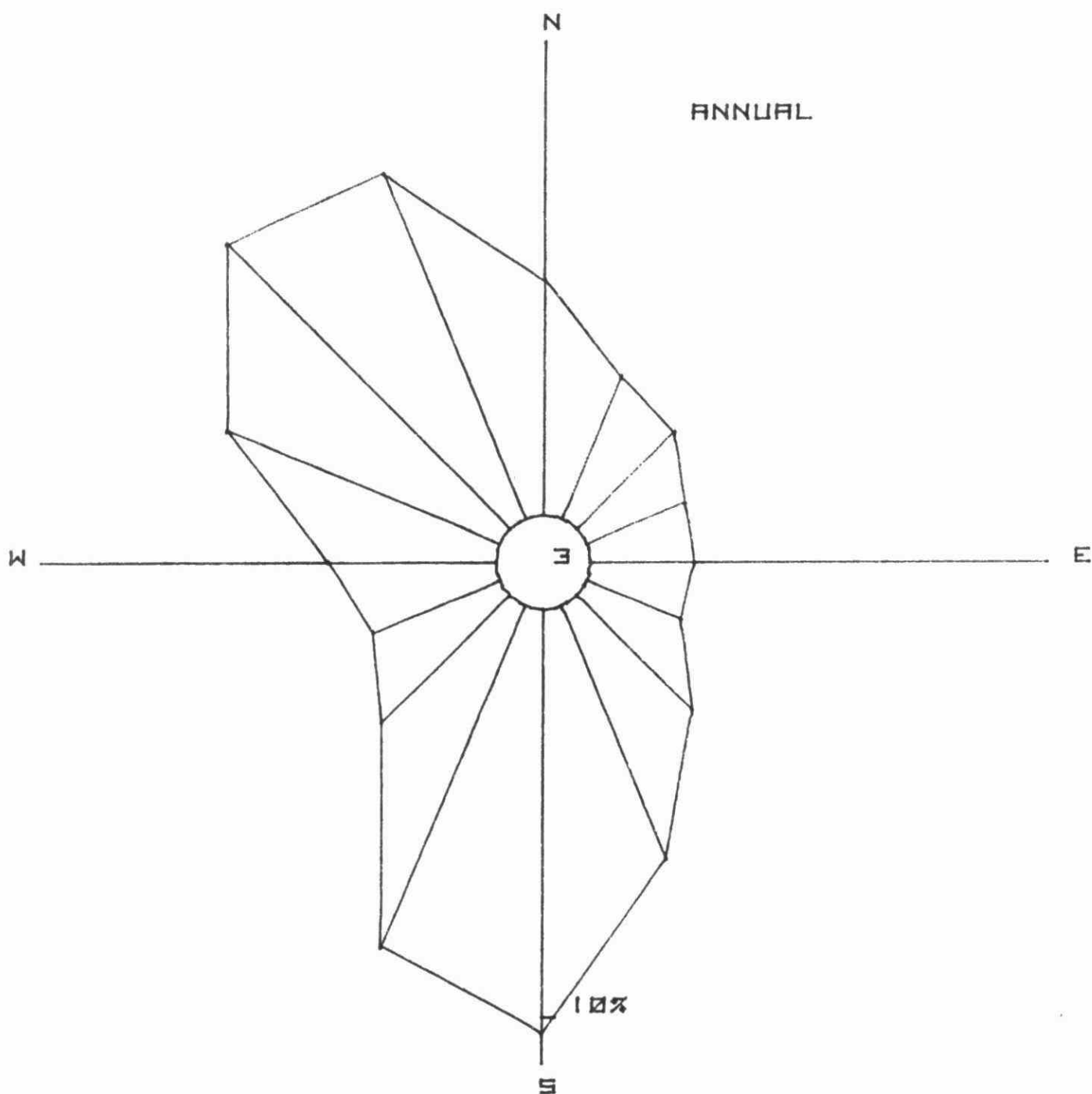
PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
5	11	12	4	1	5	31	25	0

KENDRA (AES) 1955-1972

36

(BIASES REMOVED)



STATION INFORMATION

LOCATED 8KM E OF TOWN IN ROLLING
BUSH COUNTRY. NW OF AIRPORT IS A RIDGE
EXTENDING 31M ABOVE FIELD LEVEL.
HEIGHT 10.2M

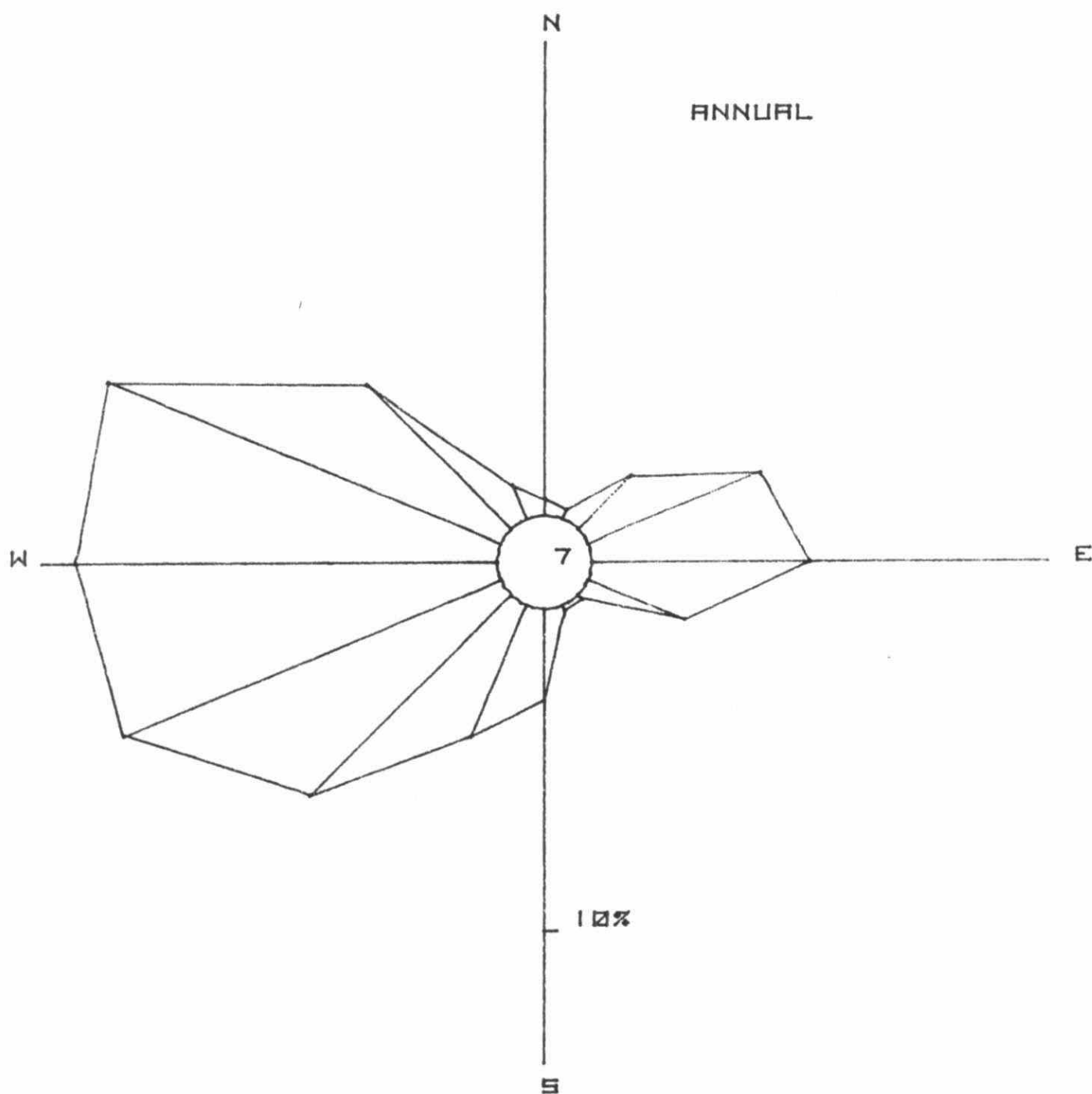
PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
0	4	4	3	3	3	5	7	10	8	5	4	5	8	10	8	3

KILLALOE (AES) 1955-1972

37

(BIASES REMOVED)



STATION INFORMATION

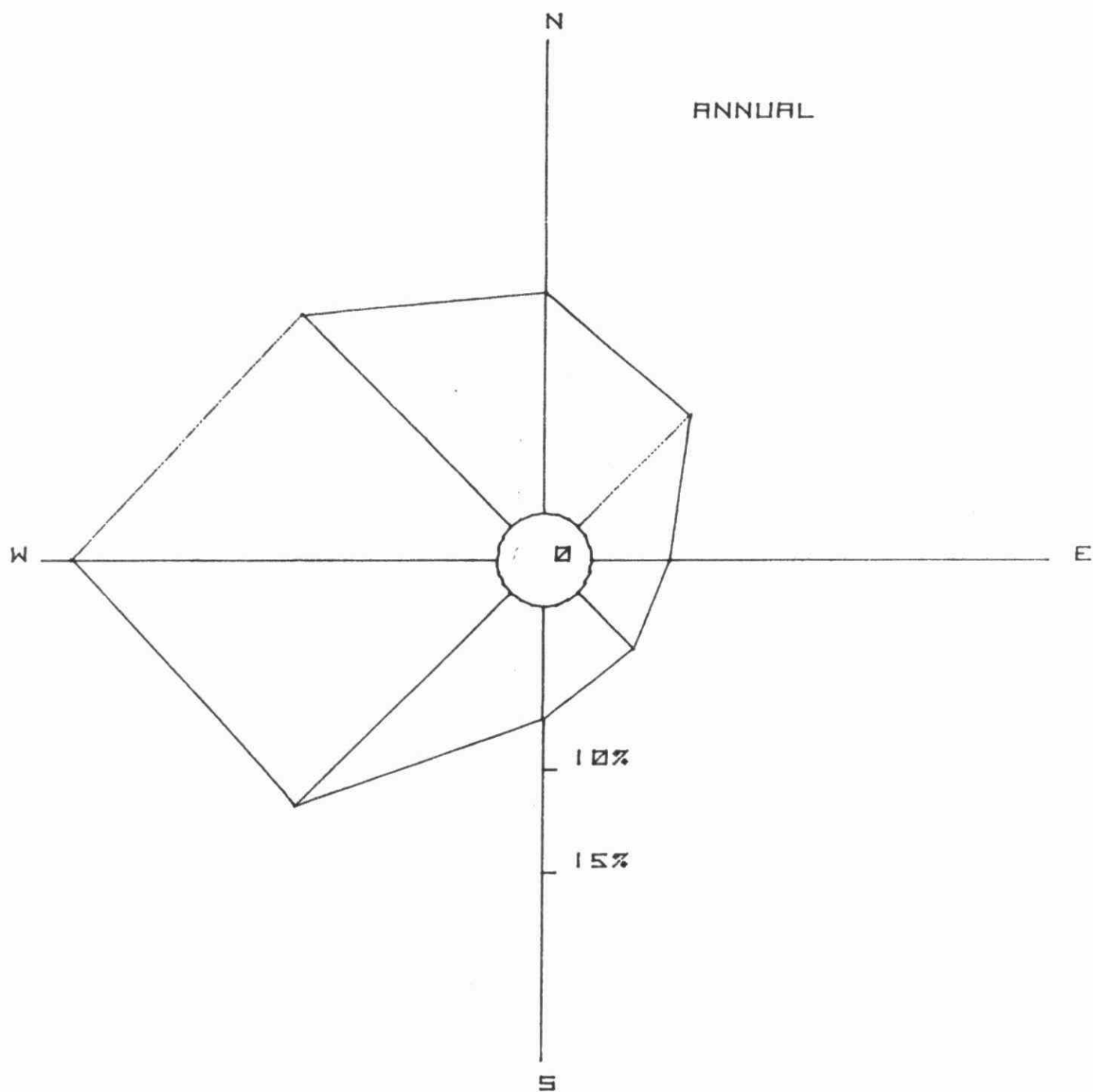
LOCATED AT AIRADIO SITE NE 2.4KM OF TOWN ON
S SIDE HWY 60 NEAR GOLDEN LAKE, AREA AROUND
STN FIELD IS WOODED. HIGH TREES AFFECT N
WINDS. HEIGHT 17.5M

PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
2	2	3	6	7	4	1	1	4	5	8	12	13	13	7	2	7

MOOSONEE (AES) 1955-1972
(BIASES REMOVED)

44



STATION INFORMATION

LOCATED NW BANK MOOSE RIVER 16KM SW JAMES
BAY, FLAT HEAVILY WOODED AREA, TOWER 92M W
OF OPERATIONS BLDG.
HEIGHT 10.2M

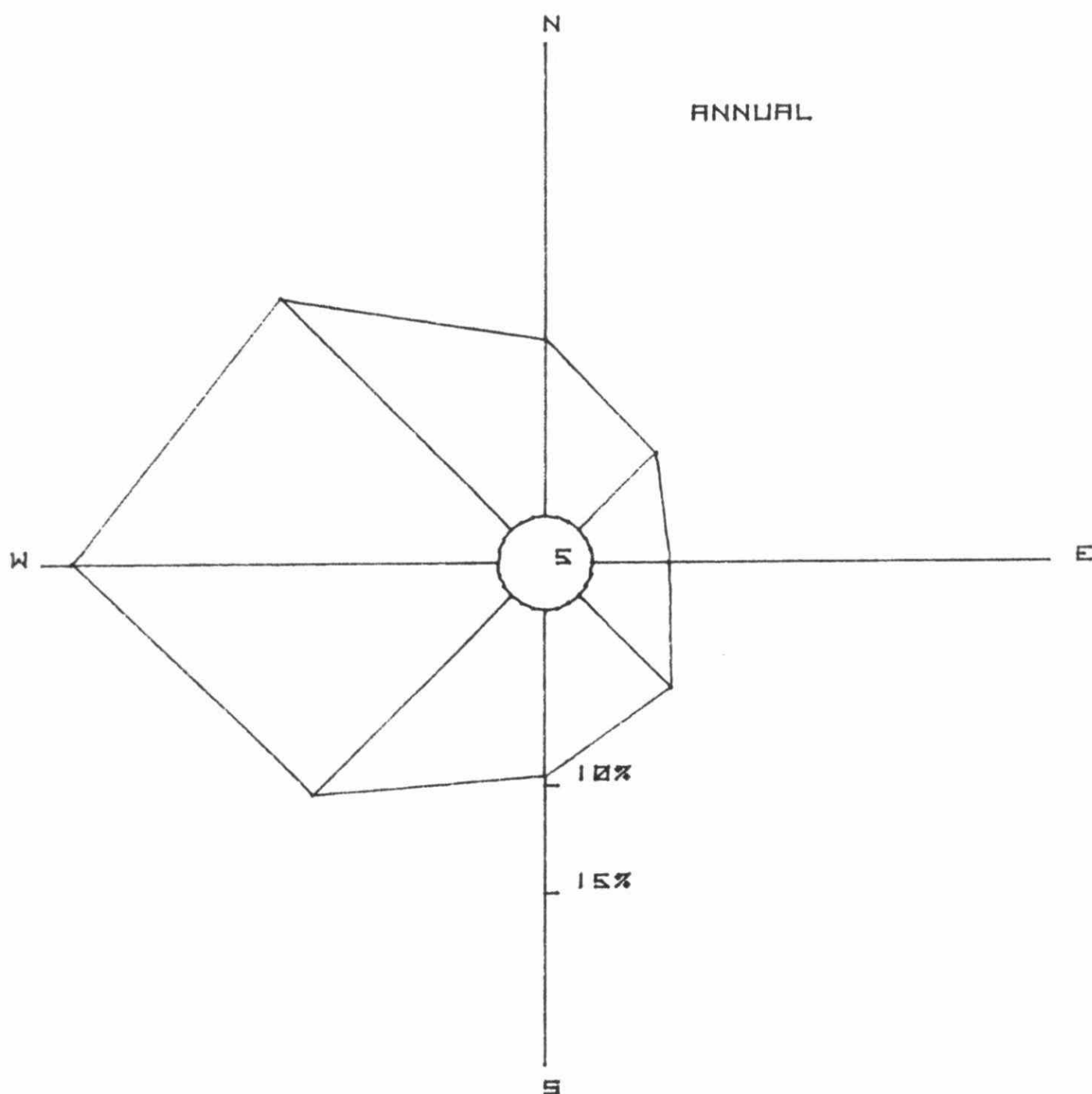
PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
13	10	6	6	8	17	23	17	0

NAGAGAMI (AES) 1964-1969

47

(BIASES REMOVED)



STATION INFORMATION

LOCATED IN HEAVILY WOODED AREA, WOODS IN ALL DIRECTIONS. CONSIDERABLE SHELTERING TO E-S AND SW. GOOD SWEEP FROM W AND NW
HEIGHT 13.2M

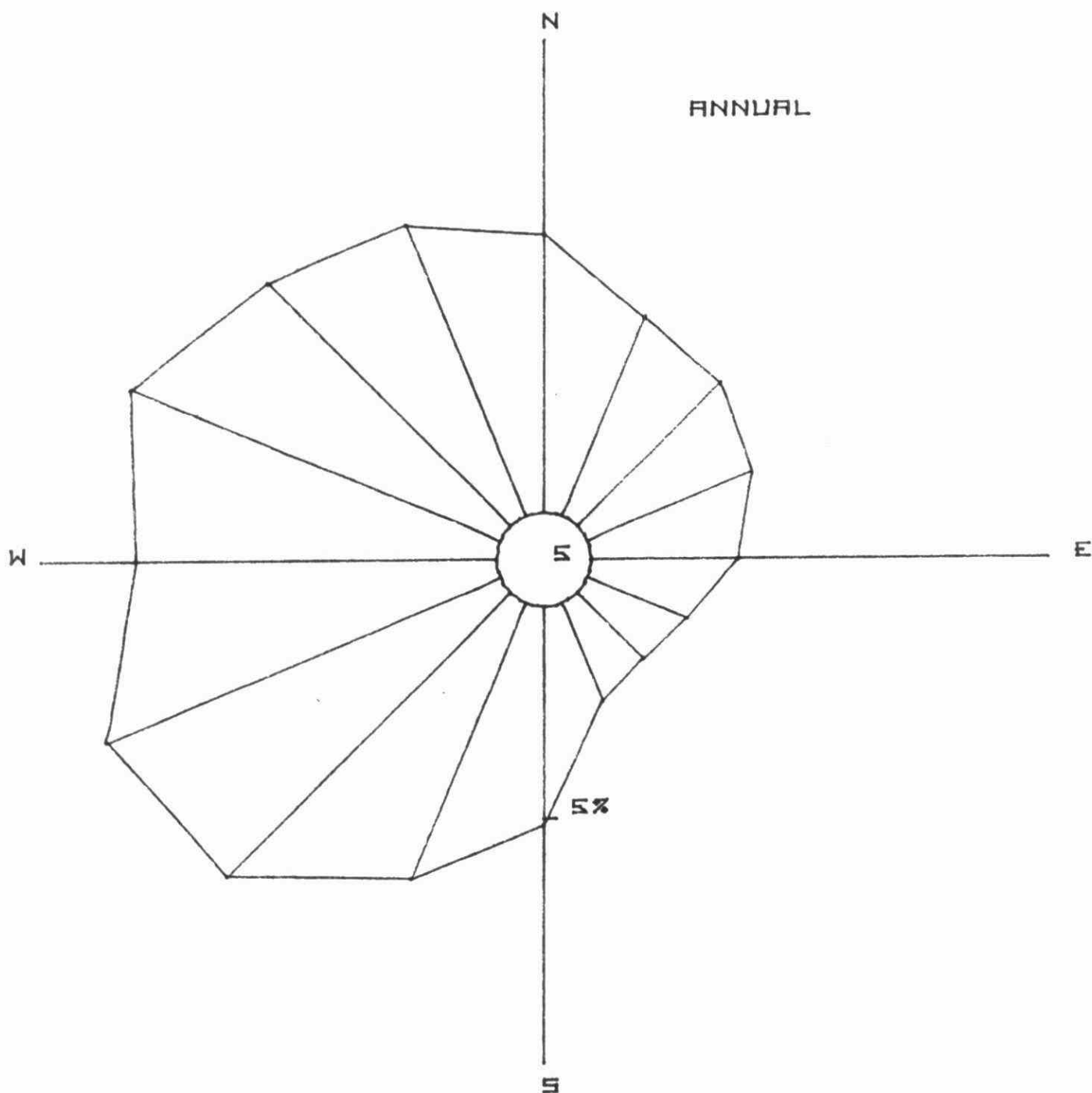
PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
10	7	8	8	10	15	22	17	5

NAKINA (AES) 1955-1967

48

(BIASES REMOVED)



STATION INFORMATION

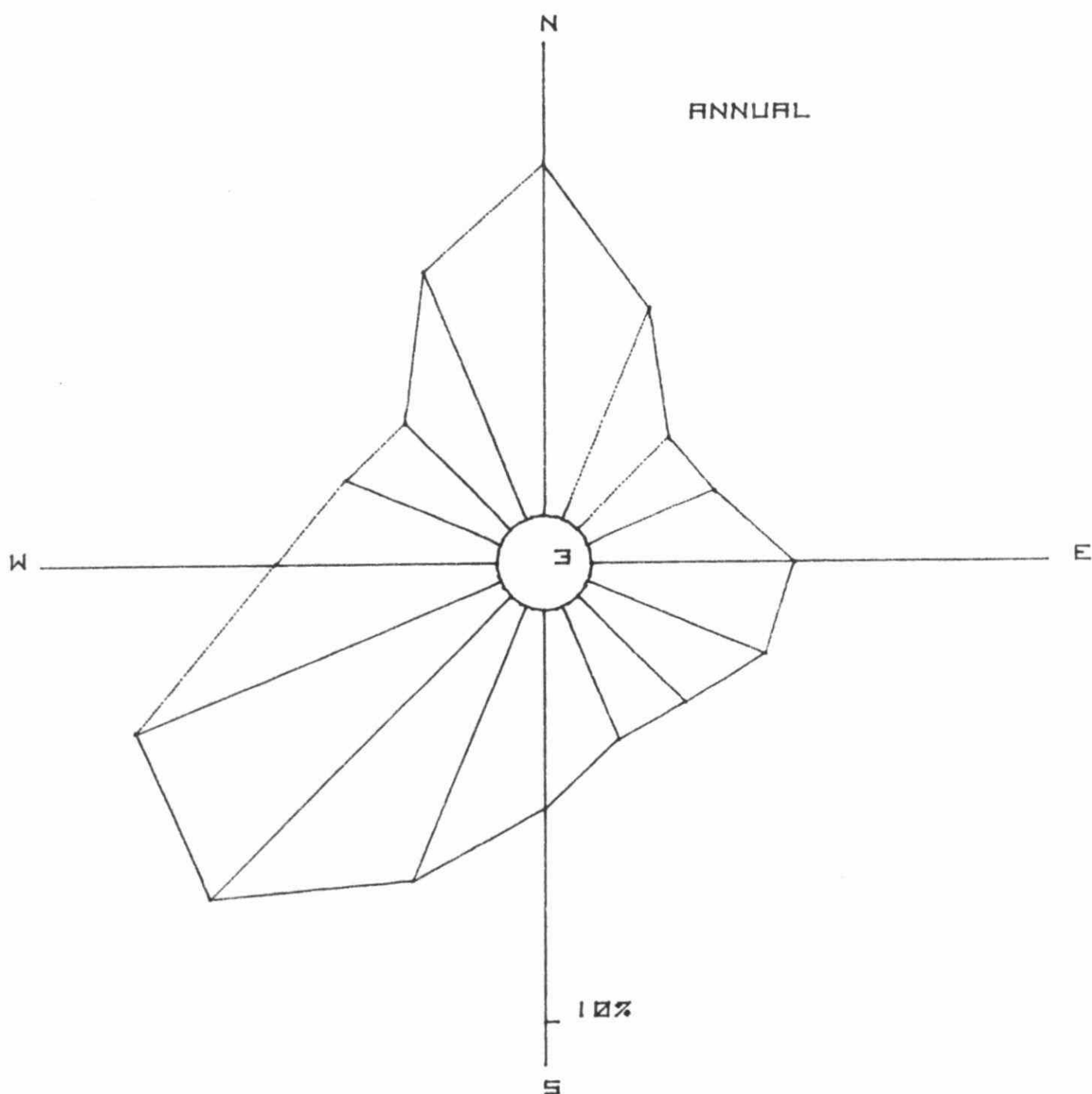
LOCATED AT AIRPORT IN FOREST. COUNTRY HILLY
WITH ODD FLAT AREA. NO OBSTRUCTIONS EXCEPT
N WHICH HAS 9.2-13.8M HIGH TREES
HEIGHT 16M

PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
5	5	5	4	4	3	3	3	5	7	5	5	5	5	5	7	5

NORTH BAY (AES) 1955-1972
(BIASES REMOVED)

51



STATION INFORMATION

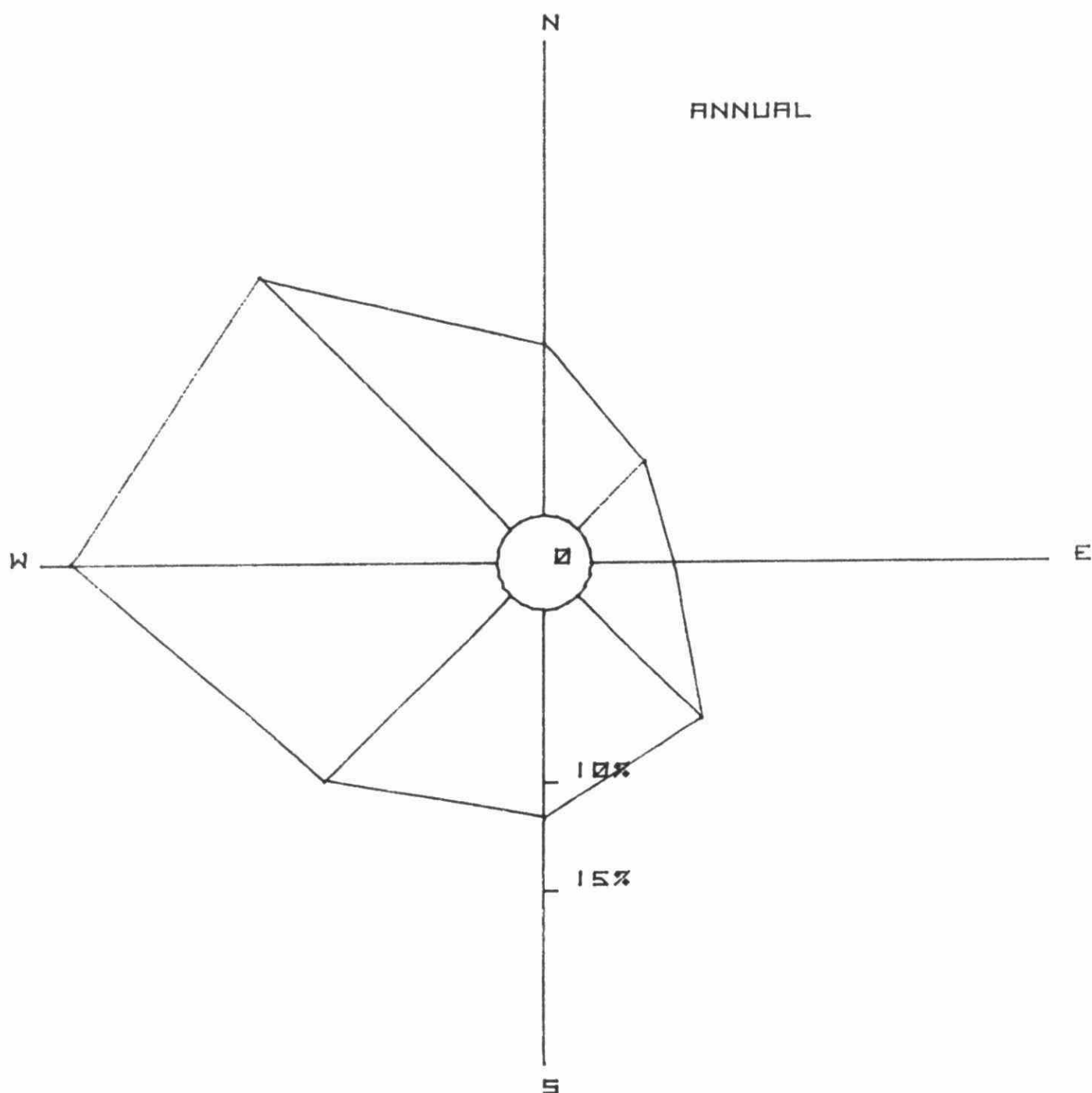
LOCATED ON AIRFIELD, N OF CITY IN SLIGHTLY
HILLY COUNTRY WITH AN ESCARPMENT IN A E-W
DIRECTION SOUTH OF AIRPORT. NO OBSTRUCTIONS
HEIGHT 13.2M

PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
3	6	4	4	5	5	4	4	5	8	10	10	6	5	4	7	3

OAK RIDGES (AES) 1922-1941 (BIASES REMOVED)

52



STATION INFORMATION

LOCATED IN A DEPRESSION ON THE SW-NE
RUNNING HEIGHT OF LAND SEPARATING LAKE
ONTARIO AND GEORGIAN BAY DRAINAGE AREA
HEIGHT 24.6M

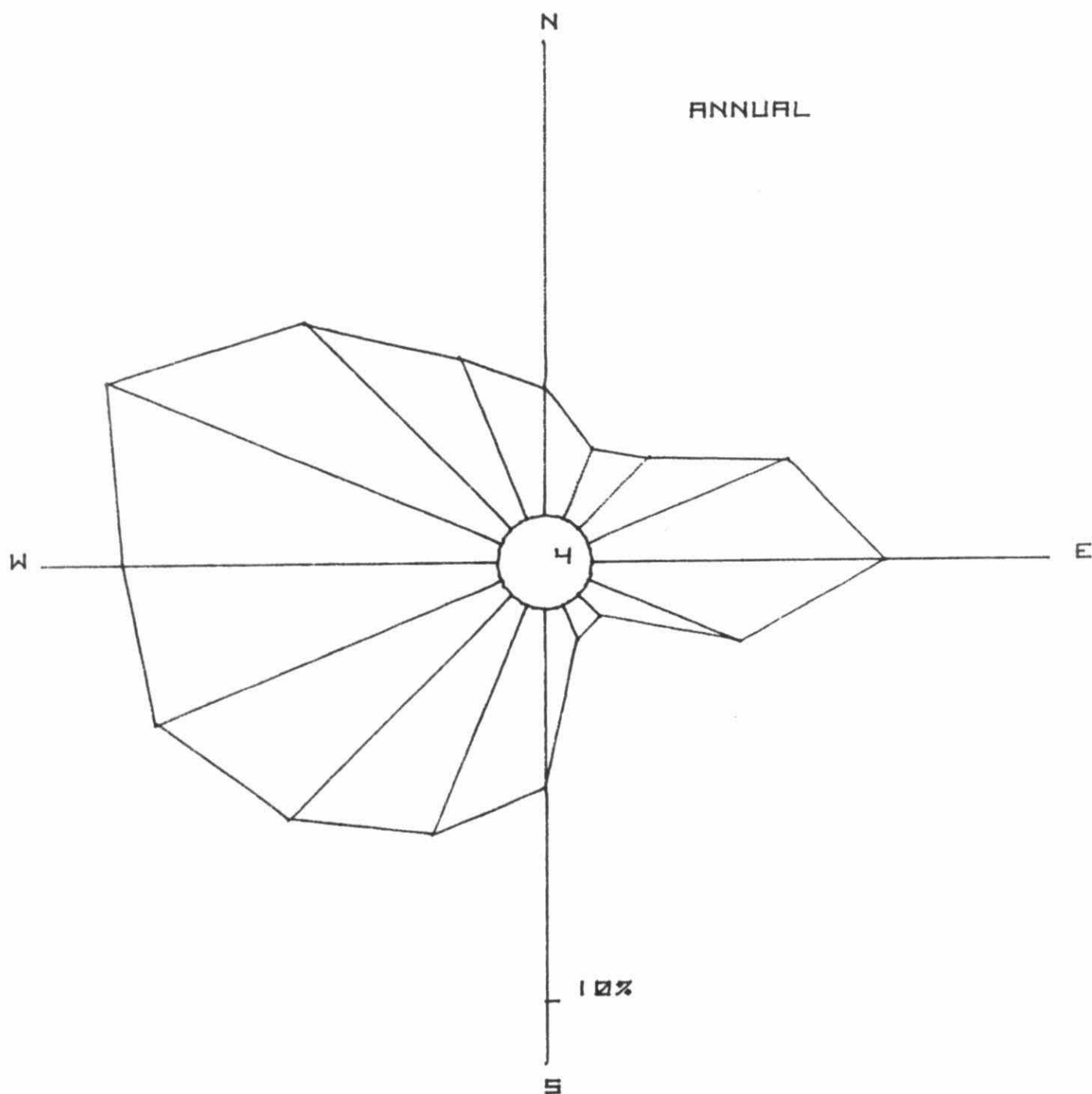
PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
10	7	6	10	12	14	22	19	0

OTTAWA (INT'L A) (AES) 1955-1972

53

(BIASES REMOVED)



STATION INFORMATION

LOCATED AT THE AIRPORT
SE OF CITY IN SLIGHTLY ROLLING AREA
APPROX 25.6KM NW TO GATINEAU HILLS
HEIGHT 10.2M

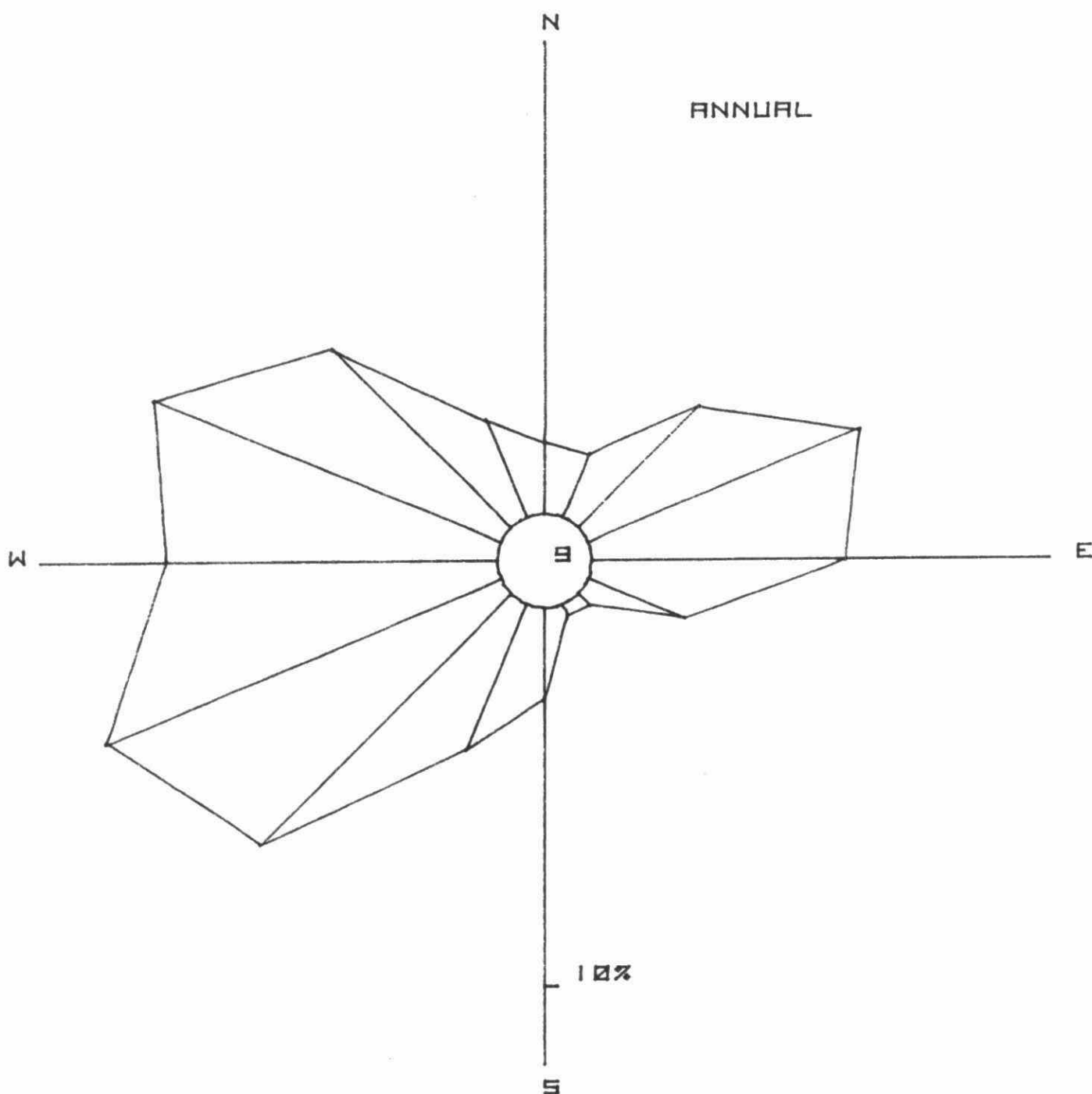
PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
4	3	3	8	8	5	2	2	5	7	8	10	10	11	8	5	4

OTTAWA (ROCKCLIFFE) (AES) 1955-1964

55

(BIASES REMOVED)



STATION INFORMATION

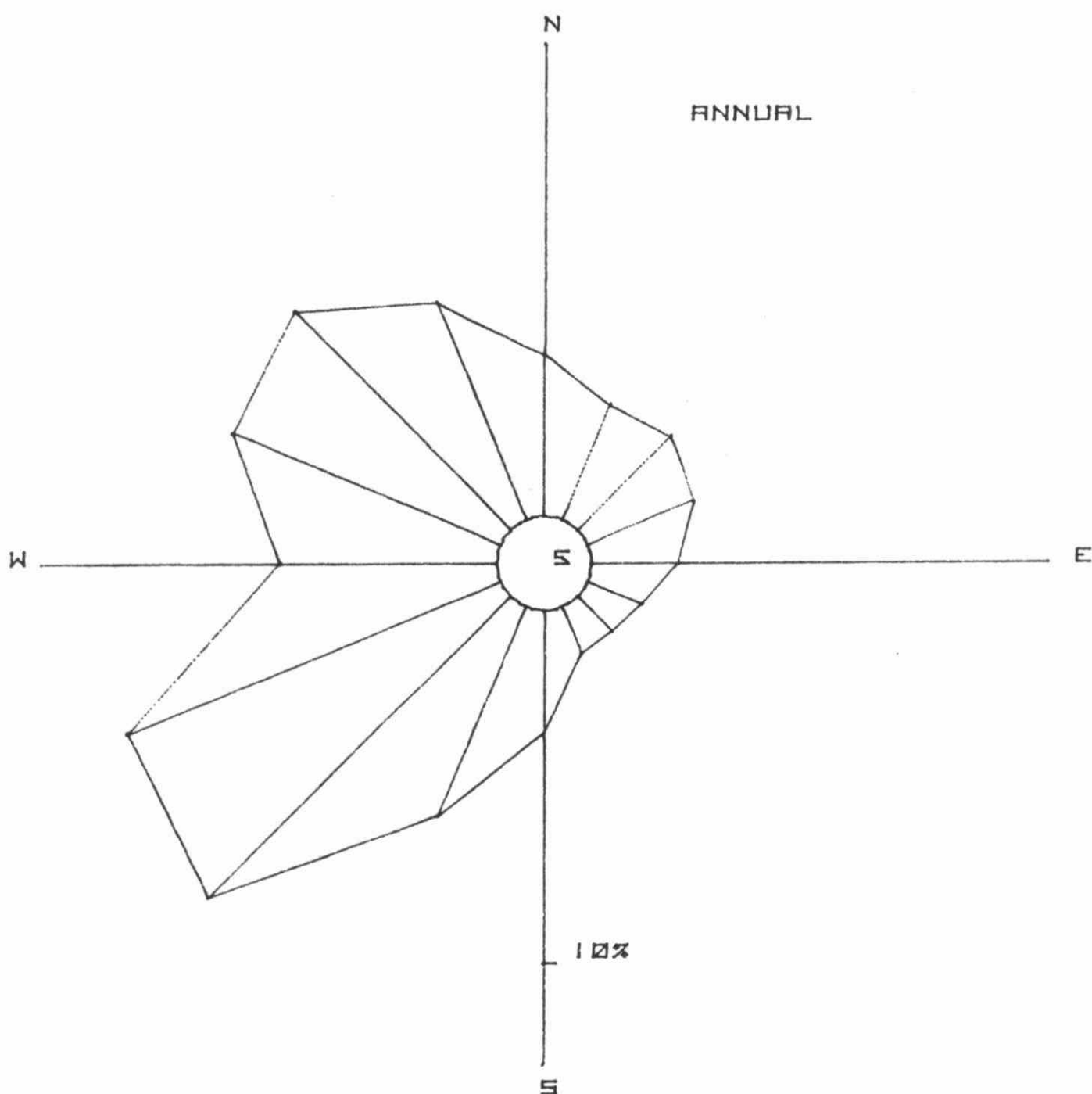
LOCATED AT AIRPORT E OF OUTSKIRTS,
1.5KM N ON HWY 17 ON S SHORE OTTAWA
RIVER. SURROUNDING COUNTRY IS ROLLING.
HEIGHT 15.4M

PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
3	3	5	8	7	4	2	1	3	5	10	11	8	10	7	4	9

PAGWA (A) (AES) 1955-1964
(BIASES REMOVED)

56



STATION INFORMATION

LOCATED IN FAIRLY FLAT AREA EXCEPT FOR A
NARROW VALLEY 3.2KM E OF PAGWACHURAN RIVER
WHICH FLOWS THROUGH VALLEY. ANEMOMETER IS
BELOW TREES. HEIGHT 13.2M

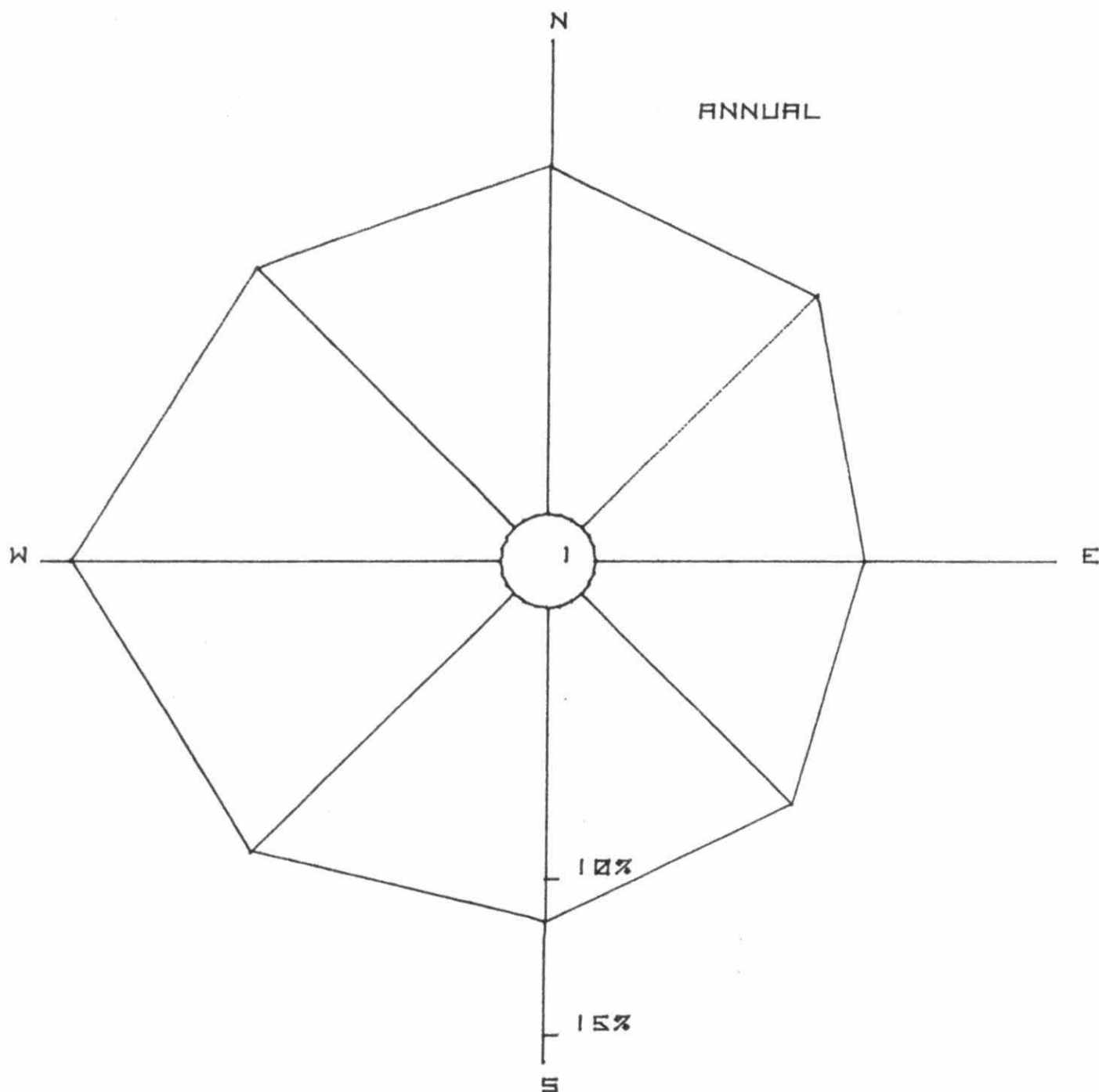
PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
5	4	5	4	3	3	2	2	4	7	12	11	7	9	9	7	5

PARRY SOUND (AES) 1937-1949

58

(BIASES REMOVED)



STATION INFORMATION

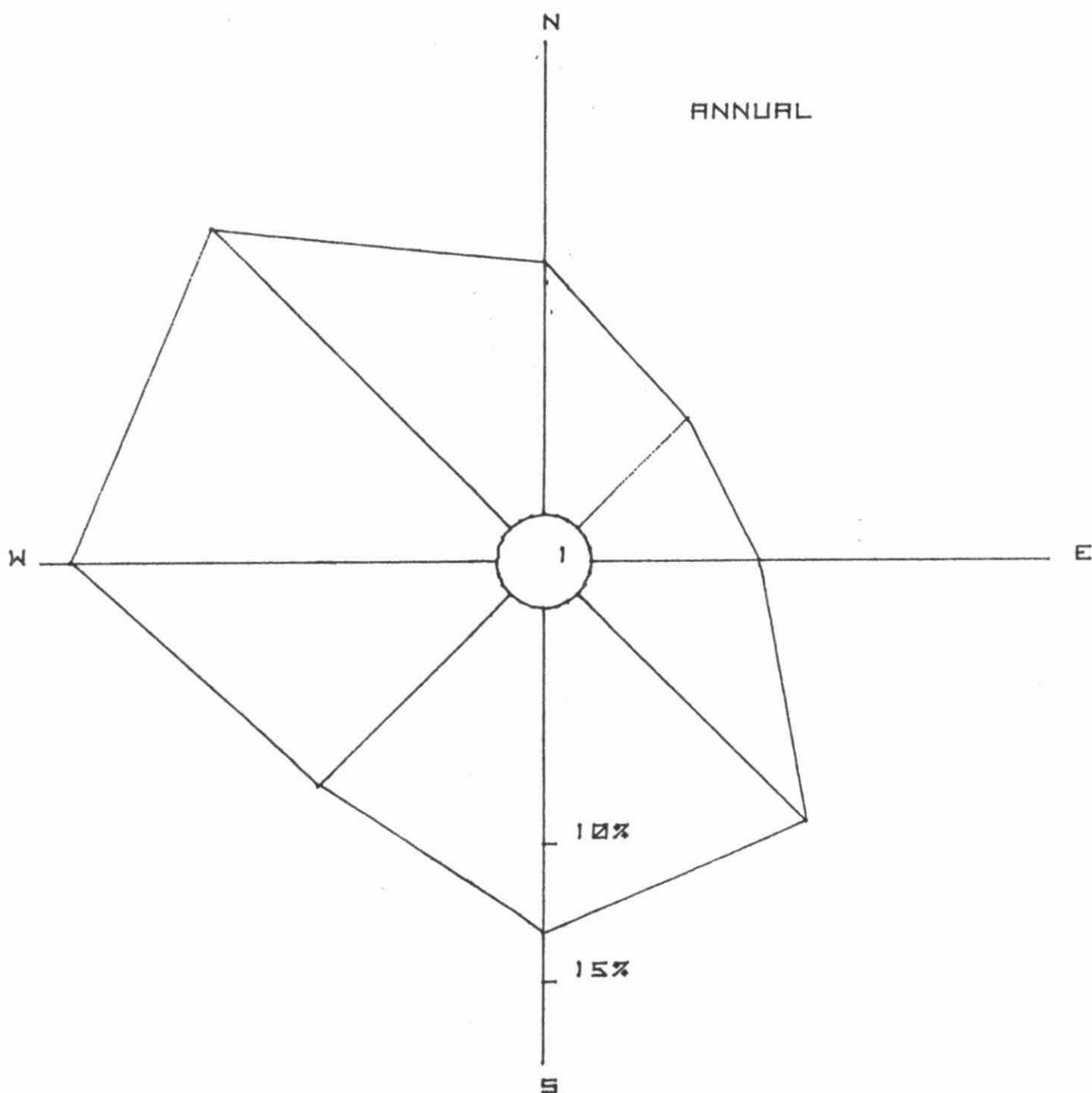
LOCATED WHEN OPERATED
WAS IN TOWN. WITH HIGH FORESTED LAND TO THE
NW. AREA IS HILLY AWAY FROM GEORGIAN BAY.
HEIGHT 13.8

PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
13	12	10	11	12	13	15	13	1

RED LAKE (AES) 1964-1972
(BIASES REMOVED)

64



STATION INFORMATION

LOCATED AT COCHENDOUR BKM W OF RED LAKE
AIRPORT 4KM N OF TOWN. AREA IS FOREST COVERED
MUSKEG, ROCKY WITH MANY LAKES.
HEIGHT 10.2M

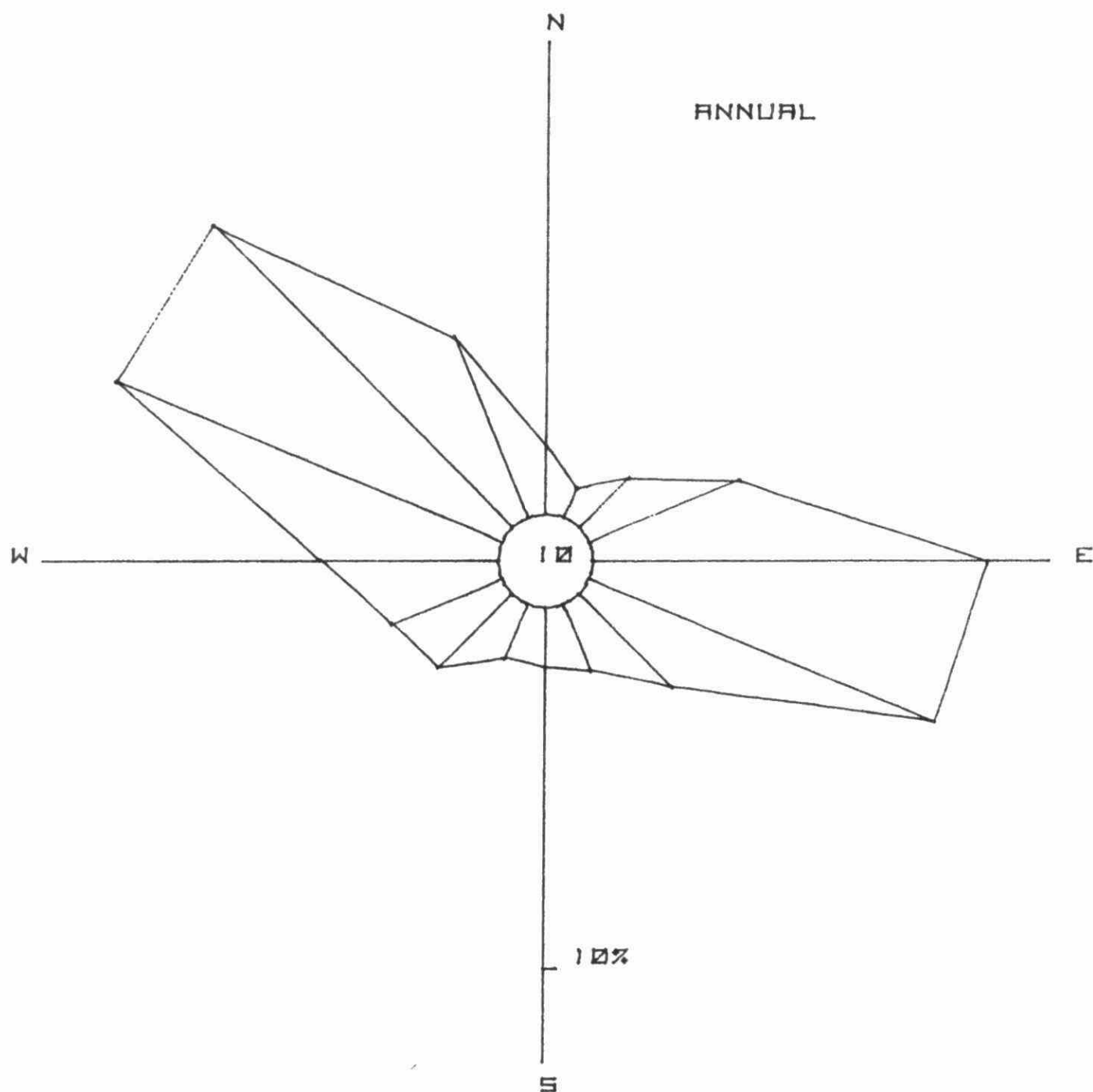
PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
11	7	8	13	13	11	17	17	1

SAULT STE MARIE (AES) 1961-1972

68

(BIASES REMOVED)



STATION INFORMATION

LOCATED AT AIRPORT IN FLAT COUNTRY. APPROX 6.4KM TO THE N IS A RIDGE OF HILLS. 3.8KM TO N-NW IS LAKE SUPERIOR. 1.2KM TO THE SOUTH IS THE RIVER. HEIGHT 12.9M

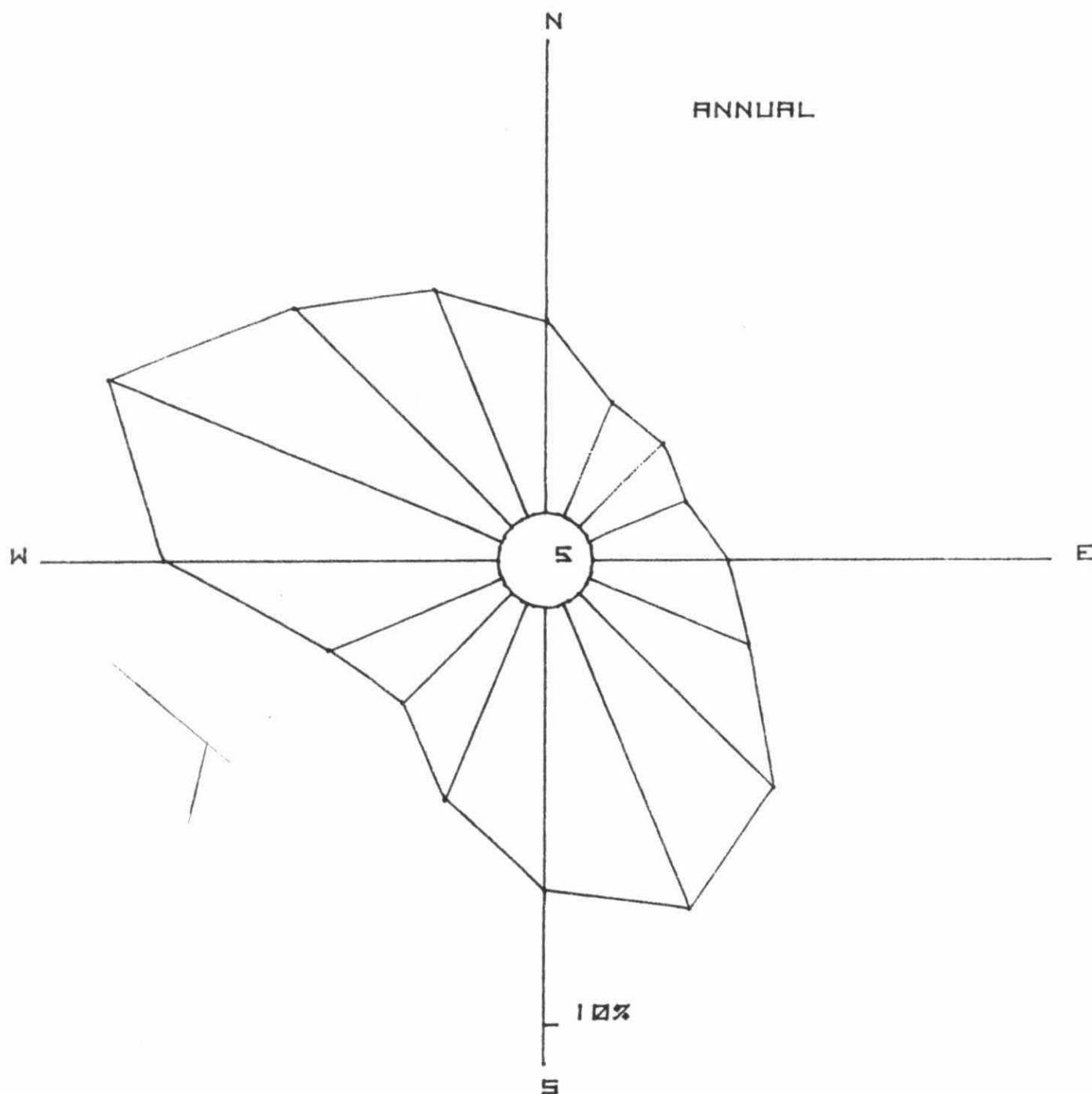
PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
3	2	3	5	11	10	4	3	3	3	4	4	6	12	12	6	10

SIOUX LOOKOUT (AES) 1955-1972

73

(BIASES REMOVED)



STATION INFORMATION

LOCATED 2.8KM TO N. OF SIOUX LOOKOUT. ANEMOMETER IS ATTACHED TO 20M BEACON TOWER. AREA IS HILLY AND HEAVILY TREED WITH MANY LAKES. HEIGHT 10.2M

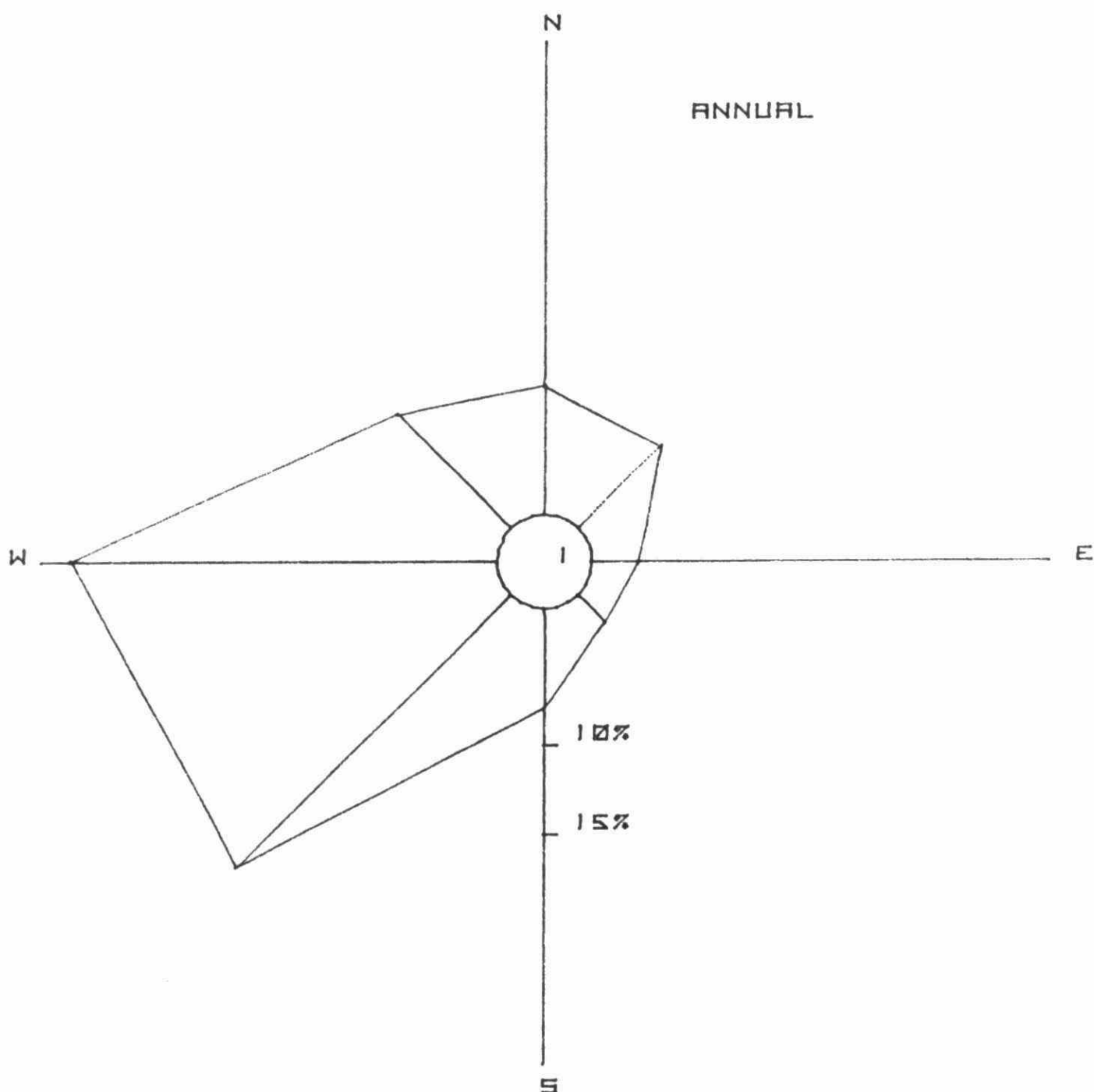
PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
5	4	4	3	4	5	7	8	7	6	4	5	8	10	8	6	5

ST. CATHARINES (AES) 1955-1964

77

(BIASES REMOVED)



STATION INFORMATION

LOCATED
OUTSIDE N LIMITS OF CITY
IN FRUIT FARM AREA.
HEIGHT 11.4M

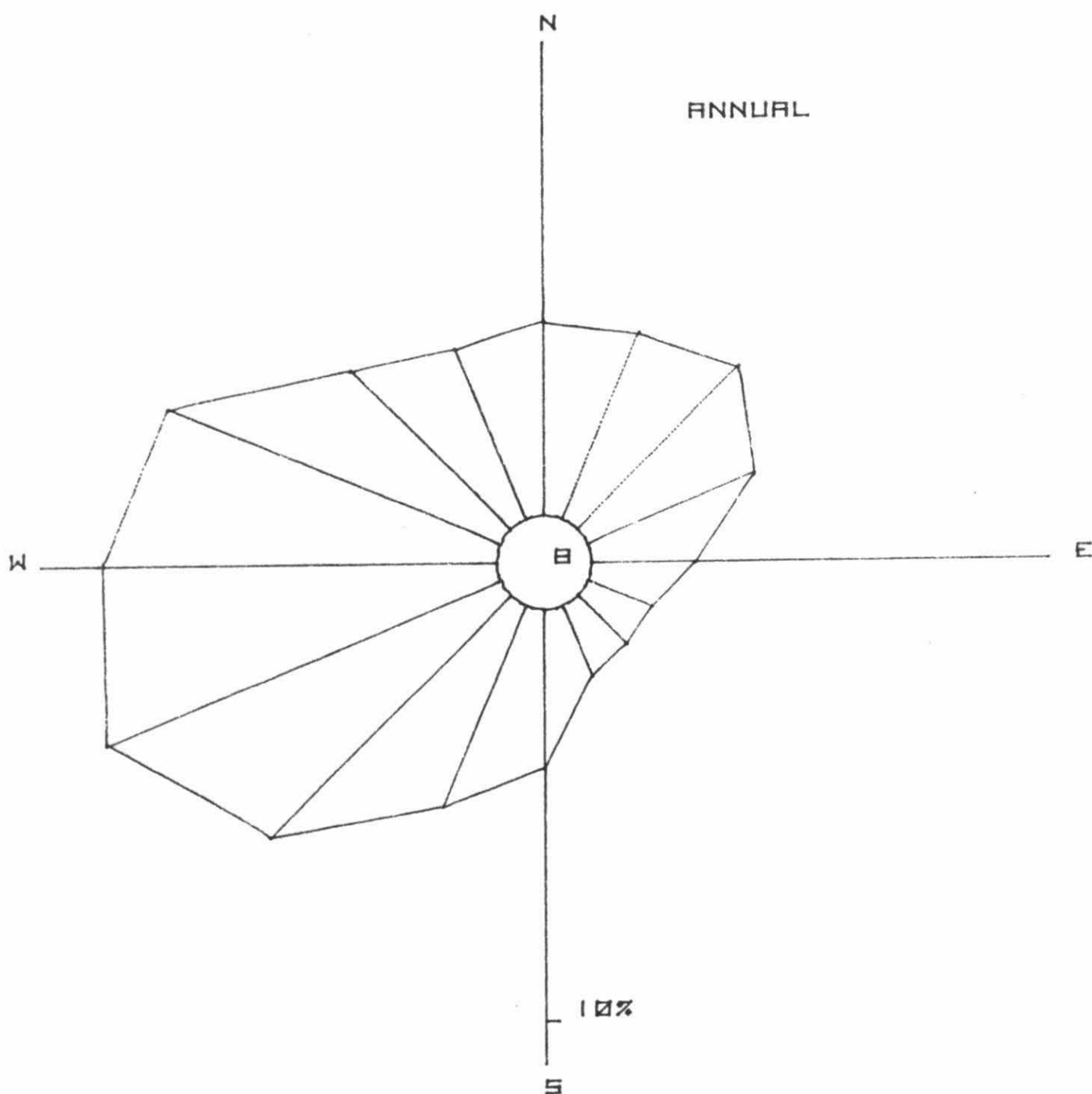
PERCENTAGE FREQUENCY

N	NE	E	SE	S	SW	W	NW	CALM
10	8	5	5	8	24	26	12	1

STIRLING (AES) 1955-1968

78

(BIASES REMOVED)



STATION INFORMATION

LOCATED 7.2KM W-NW ON CONCESSION RD 2KM
N OF MAIN RD. ROLLING COUNTRY IN ALL
DIRECTIONS. TREES 45M HIGH OBSTRUCTS TO W.
HEIGHT 14.2M

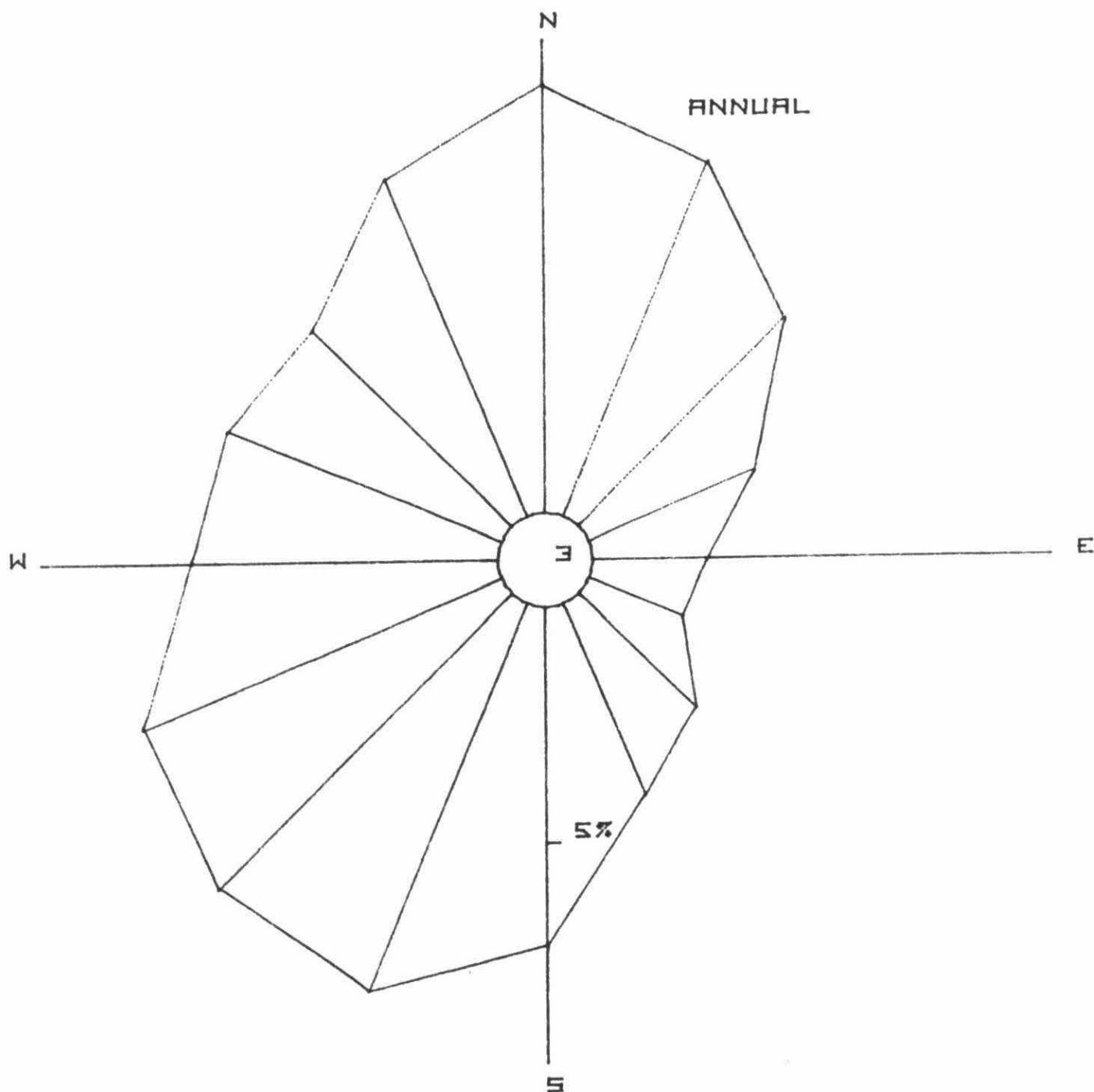
PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
5	5	6	5	3	3	3	3	5	6	9	10	10	9	6	5	8

SUDBURY (A) (AES) 1955-1968

80

(BIASES REMOVED)



STATION INFORMATION

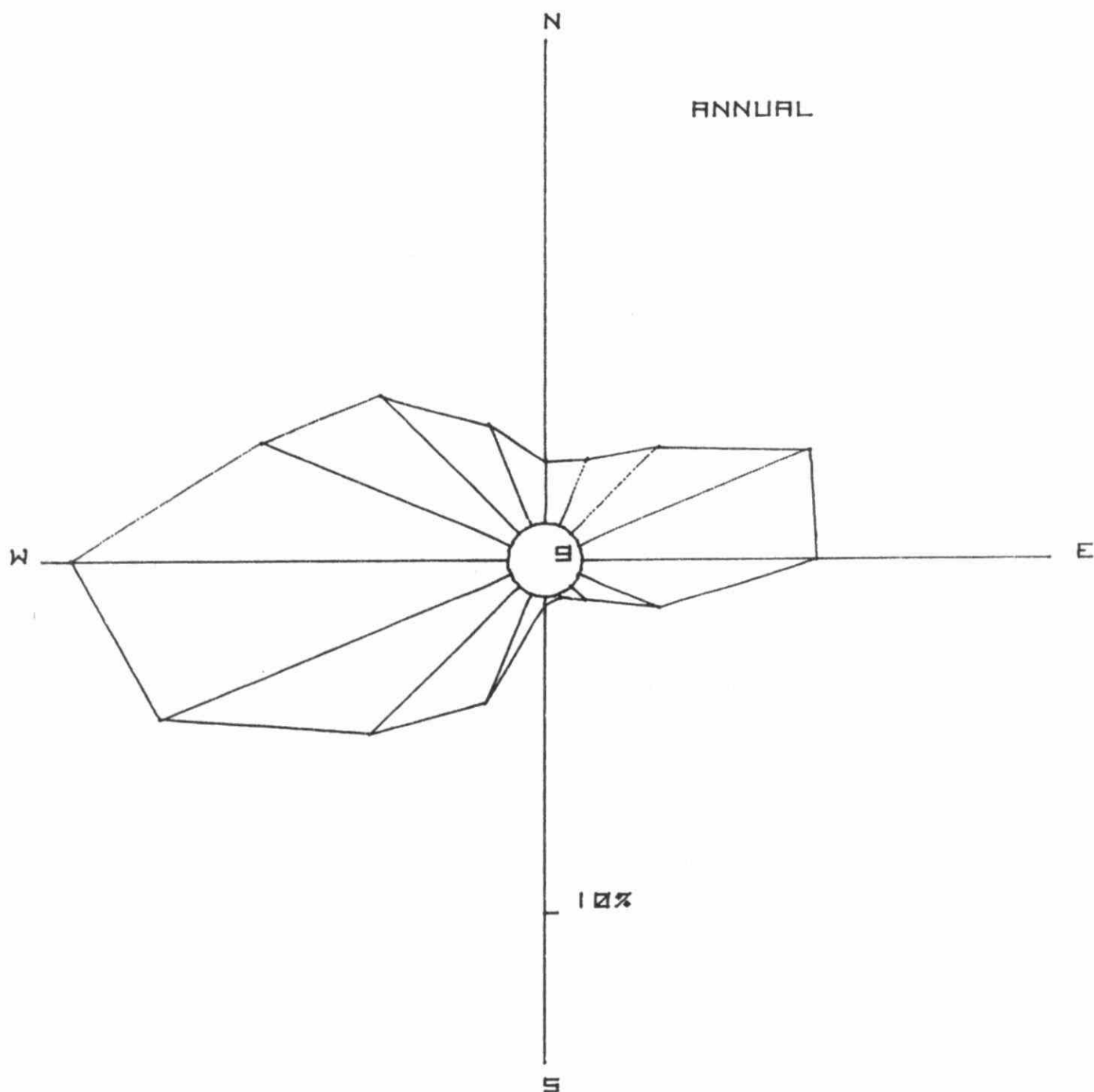
LOCATED 24KM NE OF CITY ON PLATEAU, NEAR A VALLEY THAT IS 16KM LONG ABOUT 4.6KM W. COUNTRY IS ROLLING HEIGHT 10.2M

PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
8	8	6	4	3	3	4	5	7	8	8	8	6	6	6	7	3

THUNDER BAY (AES) 1955-1972
(BIASES REMOVED)

84



STATION INFORMATION

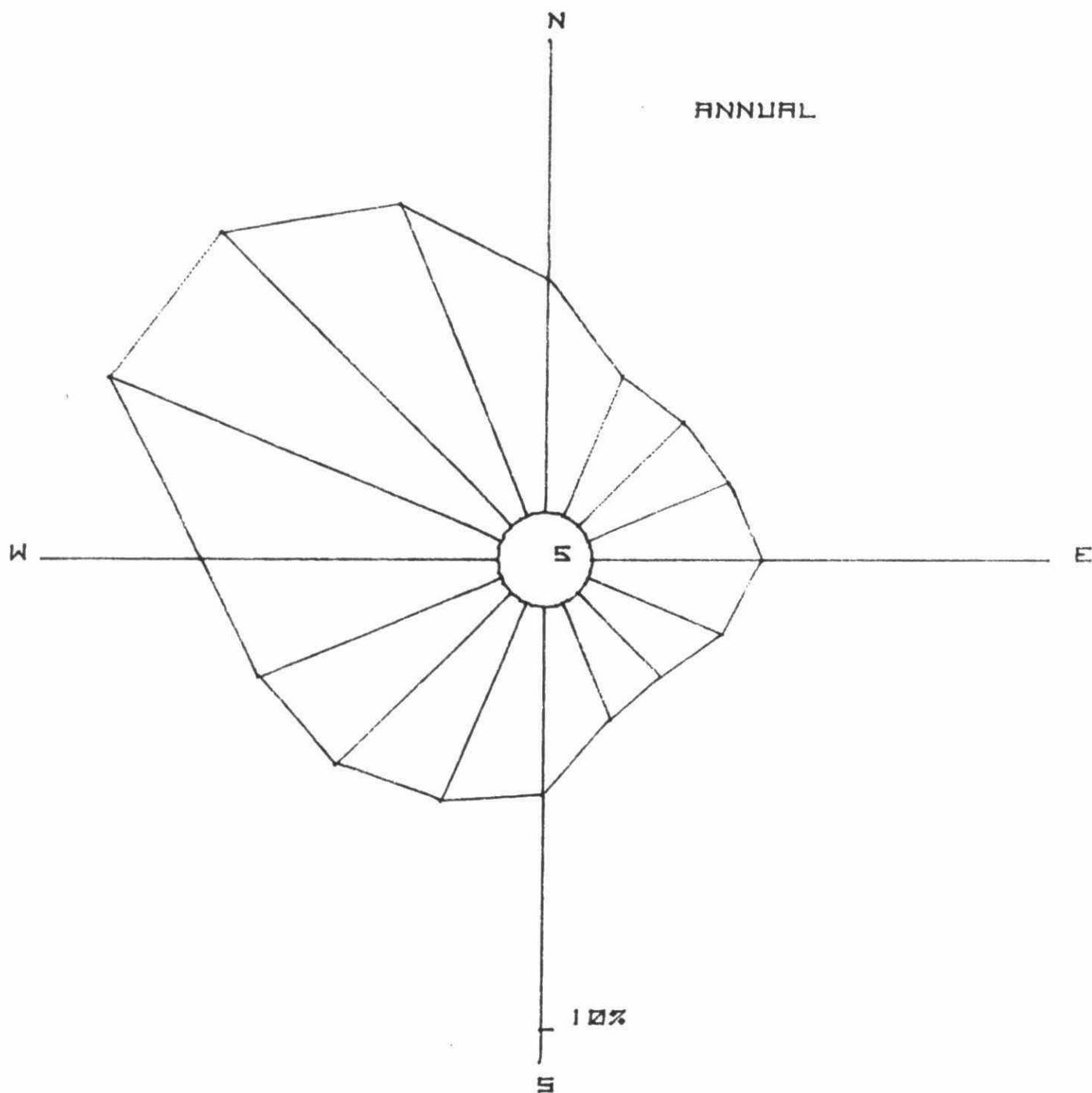
LOCATED 8KM W OF LAKE SUPERIOR. HIGH
GROUND ALL DIRECTIONS EXCEPT E. LOCAL
AREA FLAT. MT MCKAY 3.2KM TO S.
HEIGHT 10.2M

PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
3	3	5	6	6	4	2	1	1	4	7	12	14	9	7	4	9

TROUT LAKE (AES) 1968-1972
(BIASES REMOVED)

23



STATION INFORMATION

LOCATED ON AN ISLAND NEAR N SHORE OF BIG
TROUT LAKE. COUNTRY IS FLAT WITH HEAVY WOODS
AND MUSKEG. NUMEROUS LAKES. SITE WELL EXPOSE
HEIGHT 10.2M

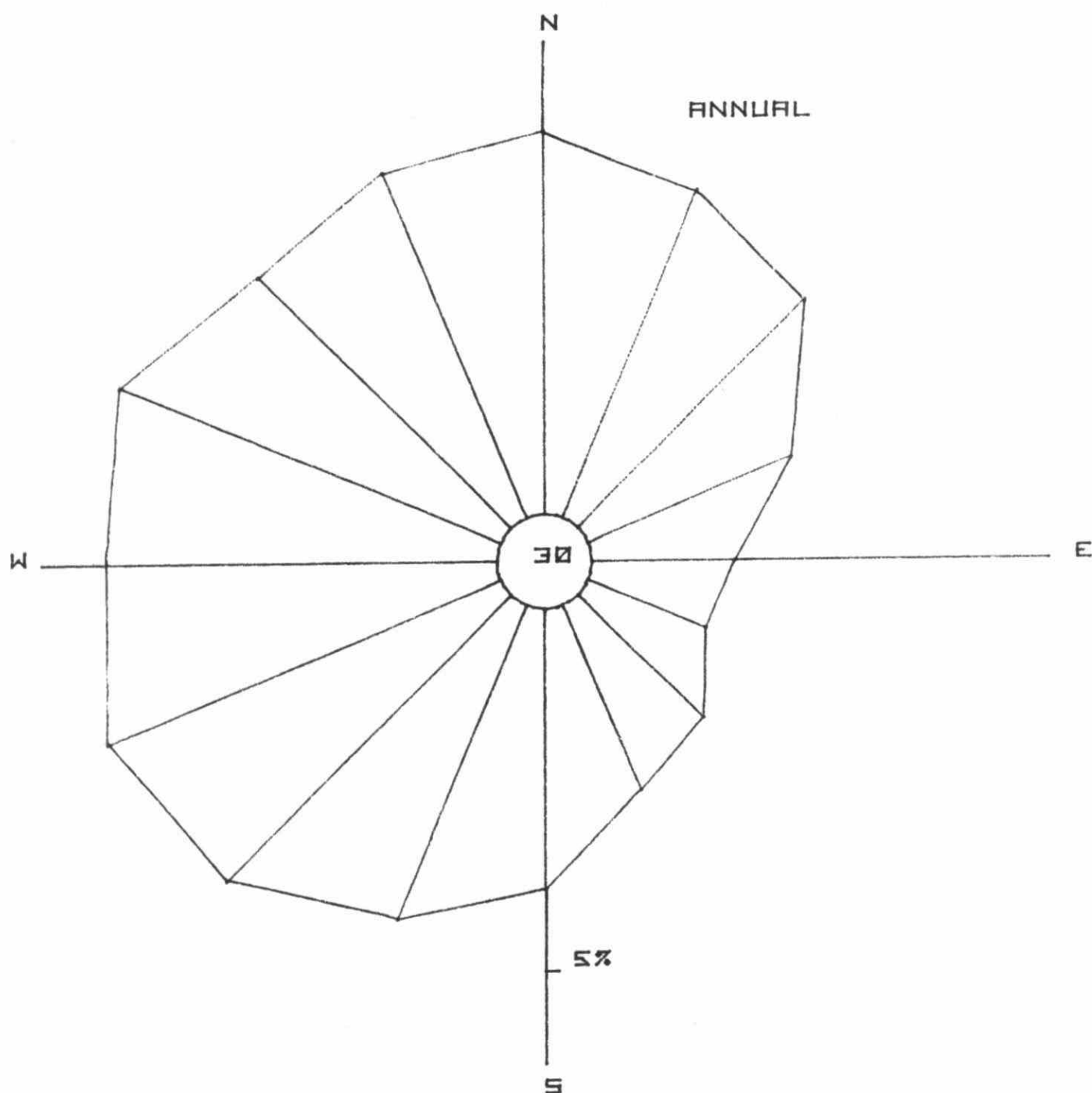
PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
8	4	4	4	5	4	4	4	5	6	6	7	7	10	10	8	5

WHITE RIVER (AES) 1955-1972

(BIASES REMOVED)

97



STATION INFORMATION

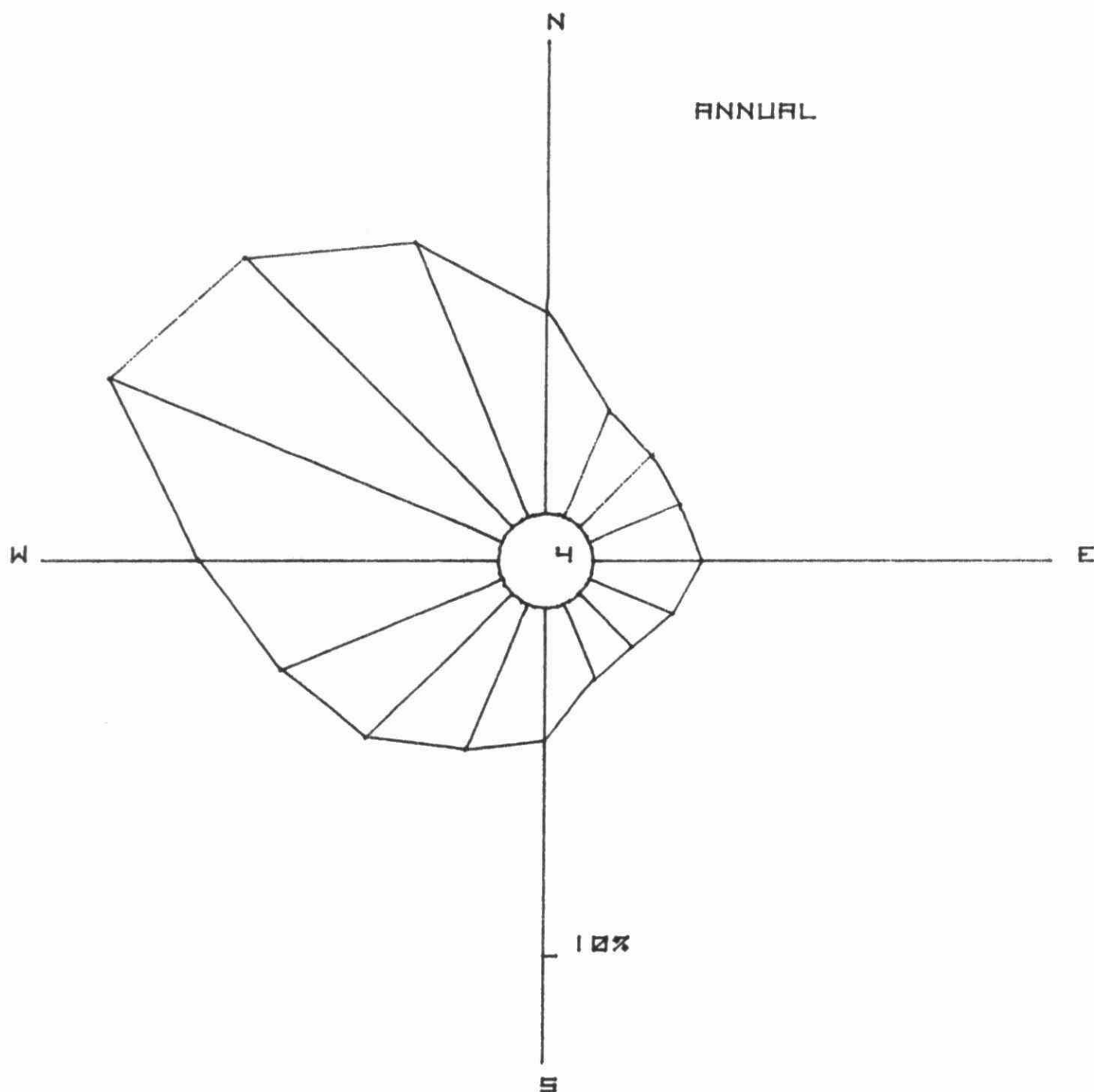
LOCATED IN SAUCER LIKE DEPRESSION AT AIR
SERVICE BLDG. HILLY COUNTRY IN ALL DIRECTION
WITH TREES AND BUSH REMOVED.
HEIGHT 10.2M

PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
5	5	5	3	2	2	3	3	4	5	6	6	5	6	5	5	30

WINISK (A) (AES) 1957-1965
(BIASES REMOVED)

104

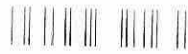


STATION INFORMATION

LOCATED IN GENERALLY FLAT COUNTRY.
MUSKEG WITH LOW TREES LYING APPROX
1.6KM FROM STATION TO S-NW.
HEIGHT 13.8M

PERCENTAGE FREQUENCY

N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
6	4	4	4	4	4	3	3	5	5	6	7	8	12	11	8	4



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ALL INFORMATION CONTAINED
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DATE 11-11-01 BY 60322